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PROBLEMS OF GEOGRAPHIC INFLUENCE[1]

FOUR points of view will be taken with reference to our theme: its importance, its difficulties, the related sciences, and fields of investigation.

We deal here with the heart of geography. The ties, infinite in number, which bind life to the earth lead surely up to man. No other phase is so insistent and so appealing as the earth's influence upon our kind. The plant and animal world joins itself to our physical habitat to enrich our environment and multiply our problems. The first members of this association came into it from the field of geology, and these men have, from meeting to meeting and from year to year, marched steadily up toward the human goal of our science. In Mr. Roorbach's recent symposium on the Trend of Modern Geography,[2] by far the larger number directed their call for research toward the field of geographic influence. Whether we speak of influence, or response, or adjustment, matters little. Terminology will grow unbidden, if we are exact in our thinking.

Here lies the weight of our theme. We all have a duty to do in view of the ill-founded and doubtful conclusions too often set forth, and in view of the vast extent of the unknown in this field. The factors of influence are not carefully isolated. What these forces really do and how they do it are not shown. Ripley holds it certain "that the immediate future of this science

[1] President's address before the Association of American Geographers, read at the eleventh annual meeting, Chicago, December 30, 1914.

[2] "The Trend of Modern Geography," *Bull. Am. Geog. Soc.*, November, 1914.

will depend upon the definiteness with which its conclusions are stated and illustrated."[3] The rich and sometimes noble and rousing periods of Ratzel leave us often in the jungle of thought. But he made a trail in the jungle, and we who follow the trail may not blame him for unexplored corners of the forest. What Ratzel thinks about definite knowledge appears in his criticism of the so-called "climatic philosophers."[4] Here too Brunhes adds his call for precision:

> How does the climate influence us . . . it is just as necessary here, as elsewhere, perhaps more necessary, to rejuvenate current assumptions by analyzing them, for they are far too slipshod and superficial.[5]

This call for definiteness presses on every student of geographic influence, be the phase climatic or other. It is not that we can draw mathematical conclusions in any science of man, but sharp eyes and good logic will at least lift us from chaos to order.

We are thus under bond to work this field for the perfection of essential geography. But we owe a further debt, or rather, there is a mutual exchange of help in which we must not fail of our part. Geography offers help and cooperation to all sciences that deal with man, anthropology, ethnology, history, sociology, economics, psychology and comparative religion, and from each of these geography will gather data for its own perfecting.

The historian, for example, needs from the geographer a more full knowledge of environmental working, and the geographer receives in turn much from the historian. The old geography knew little of the causal and historical, and some of the old history might just as well have been staged on a flat platform projected into the interplanetary ether.

If history is to strike deep roots into the earth, if it is to set forth with full discernment, the moulding, moods, motives and movements of men, the historian will need help from the geographer; and the historian, sceptical of generalizations that are too easy and scorning overstatement, will respond with open hand to every real offering of the geographer.

When geography was poorer than today, Parkman wrote the human story out of its environment. James Bryce has always and without stint placed geography in the running with historical movements. And if the generalizations of Bryce, like those of Ratzel, are sometimes tinged with vagueness, let us blame, not the historian of broad outlook, but the geographer whose work is yet in arrears. Other examples are not wanting. Winsor, in dedicating his Mississippi Basin to Mr. Markham, then President of the Royal Geographical Society, writes of environment,

> I would not say that there are not other compelling influences but no other control is so steady.[6]

Mr. Edward John Payne has written a "History of the New World called America." Being no historian, I do not know the craft's estimate of that work, but I am astounded at the author's deep and broad knowledge of environment in the lands whose story he tells. The surface, the climate, the possibilities of cereal production and of the domestication of certain animals appear in such wise in relation to early American civilization, to the arts and habits of the people, as to stir the geographer to admiration. Whether all of Payne's conclusions stand fire or not, he gives an example of effort aimed at preci-

[3] W. Z. Ripley, *Pol. Sci. Quar.*, 10, 640.

[4] "Anthropogeographie," I., 83–84.

[5] J. Brunhes, Inaugural lecture, *Scot. Geog. Mag.*, 29, 312.

[6] "Mississippi Basin," Justin Winsor, following title page.

sion. This is a call to every geographer. The geographic atmosphere in Professor Turner's story of our north central west is known to us, and Professor J. L. Myres, reaching at once broadly into the fields of classic lore, anthropology and geography, is, in his person and work, living testimony to the importance of our anthropogeographic task, and to the hopefulness that lies in our attempting it.

Some historical writers are influenced little if at all by the study of the earth and lower life as elements of human environment. Even volumes professing to deal with the geographic foundation of history sometimes fail of their goal, and one preface affirms that—"the general physiography of North America is familiar enough to readers."

This, I am sure, is quite too rosy a view of the geographic situation. But I cite the limitations of some histories in no mood of criticism. Let every man build the wall over against his own house. What of assured fact or proven principle we put before the historian he has neither the will nor the power to escape. Our light is in no danger of being put under a bushel. But we have good need to see that it is lighted.

Who can show me a good human geography of Greece? Perhaps it is now in the making by a member of this association. If there be such a work, should it be possible for a historian of Greece to liken Asia Minor and Egypt to enormous jaws about to swallow Cyprus, to describe the Egean and Adriatic as *fiords*, to liken southern Europe to a mastodon, Greece being a leg; to call Greece with its mountain spurs and bays a skeletonized leaf, to fill the peninsula with tiers, storeys, waists, claws, wheels, threads and tongues, and leave you not knowing whether this poor little country is a house of many rooms or a spider with sprawling limbs. But we are most gravely assured that the geography of Greece had results upon its history, and diversity of states formed by diversity of surface is the lone geographic captive shut up in this dark closet!

If we turn to sociology we meet the insistence on the importance of environment. Let us take Giddings's definition, that

> Sociology is an attempt to account for the origin, growth, structure and activities of society by the operation of physical, vital and psychical causes, working together in the processes of evolution.

Or we may cite the utterance of Small, that "this force is incessant, that it is powerful, that it is a factor which may never be ignored."[7] Yet Dr. Small in an extended chapter on environment mentions geography but once, and then not as a science which might contribute to sociology. Professor Ridgeway[8] thinks that failure fully to recognize man as controlled by the laws of the animal kingdom leads to maladministration of alien races and blunders in social legislation. He says, further, "As physical characteristics are in the main the result of environment, social institutions and religious ideas are no less the product of environment," and again, any attempt to eradicate political and legal institutions of an equatorial race "will be but vain, for these institutions are as much part of the land as are its climate, its soil, its fauna and its flora." Ripley, in reviewing the second volume of Ratzel's anthropogeography, criticizes the author for neglecting acclimatization, considering its importance in social theory, and in view of the fact that theories of race dispersion turn upon our judgment in this matter. Perhaps the real state of the case is seen in the appearance

[7] "General Sociology," A. W. Small, 417.

[8] Wm. Ridgeway, "The Applications of Zoological Laws to Man," *Brit. Assoc. Ad. Sci.*, Dublin, 1908, 832–847.

not long ago of a serious and careful volume on the development of western civilization, which nevertheless exhibits an utter dearth of geographic data and principles.

We are safe then in saying that most authorities in these sciences of man recognize environment as fundamental, but the greater part, in a sort of absolution of conscience, name the subject and take leave of it.

We need not therefore expect the historians or the sociologists to develop in any full way the principles of environmental action. They admit the need of these principles, but have not the time, perhaps not the will, to develop them. It remains for us to put content into the word environment, so that it can not be overlooked or slighted and so that its meaning may become available in plain terms to all.

In his "Racial Geography of Europe" Ripley asserts that

> To-day geography stands ready to serve as an introduction as well as a corrective to the scientific study of human society.

This was written about twenty years ago, and yet it is to-day not so valid or truthful a statement as we could desire it to be. Our convictions are in the right place and much has been done, but we still suffer from a dearth of limited, local, special and proven data, and a surplus of generalizations announced with the enthusiasm of fresh discovery, or rediscovery, unsupported by adequate evidence. We are subject to Marett's criticism of certain generalizations of Ratzel and La Play—"too pretty to be true."[9] We are awaking to the importance of our field and this is well, but it is equally important to make haste slowly and to give human geography a content satisfying to ourselves and convincing to our fellow workers in adjoining fields.

The pursuit of our theme is as difficult as it is important. Professor Cramb in a recent book[10] comments on the causal idea so common in our modern thought about history. His word is equally good for us. He says:

> In man's history nothing is more difficult than to attain to something like a just conception of a true cause.

Universality and necessity are the criteria which he proposes. A stiff application of these principles would be a tonic for some geographical theorizing.

Here is an individual, X; What is he? He is first a bundle of anatomical characters. How did he get them? Why is he different in these matters from some other man? A single example will show how little we know. Professor Boas well says that "haphazard applications of unproved though possible theories can not serve as proof of the effectiveness of selection or environment in modifying types."[11] He calls for comparison of parents of one environment, with their children reared in another. He has made such investigation upon children of immigrants in New York City and concludes that distinct changes, as of head form, took place.[12] He has done well, no doubt, all that one piece of investigation permitted. But he does not analyze the factors of change nor show what any factor does. Alongside of these apparent changes in one generation we may put an opinion of Professor Myres, who, referring to a common belief that Alpine man originated in the Alpine region in response to environment, states his conviction that the time since the glacial period would not suffice for so great a change of head form.[13]

[9] R. R. Marett, M.A., "Anthropology," 98.

[10] J. A. Cramb, "Germany and England," 113.

[11] F. Boas, "The Mind of Primitive Man," 52.

[12] F. Boas, "Changes in Bodily Form of Descendants of Immigrants," Sen. Doc. No. 208, 61st Cong., 2d Sess., Washington, 1910.

[13] J. L. Myres, "The Alpine Races in Europe," *Geog. Jour.*, 28, 538.

Lester F. Ward is equally confident that

> There has been no important organic change in man during historic time.[14]

Our individual also embodies physiological and psychical activities which are affected by environment. Here the problem is immensely involved, for, as Brinton says, psychical development depends less on natural surroundings than on a plexus of relations of each man with many others.

Natural environment includes first the physical—soil, water, minerals, land form, temperature, moisture in the air, light, electricity, and all operative on an earth in interplanetary relation to the sun. Then is added the animal and plant environment whose daily pressure on the individual and the group has held in no small way the destinies of civilization. Interwrought with all these natural forces are the human-social factors ever more powerful since the dawn of history. Thus there is a total of infinitely variable factors producing infinitely diverse results upon the body and mind.

The environment of this day and hour is perplexing enough, but environments change: man exchanges one environment for another. The steady drive of our environment in its daily flux is replaced by the shock of a new environment entered in a day or a night or gained by long voyages across the sea. The sum of a man's heredity goes out into his new sphere with him. But how much of this is primal and persistent and how much can be shifted like a garment? The heredity doctors have not answered this question and geographers should have a care. It is a wholesome corrective to remember the number of our possible ancestors. According to Boas,[15] an Eskimo could not have so many as you or I. Royal families share this limitation with the polar man, and one European monarch, it is said, has in the past twelve generations only the meager outfit of 533 ancestors out of a theoretical 4,096. We, however, belonging to a large population of unstable habits might have in twenty generations more than a million each. We are too complex to come to an easy reckoning about ourselves.

By our social memory we carry the old environment into the new, and thus we "compound"[16] environments, and this ends in making environment coextensive with the world. The universality of modern environment for any civilized man appears in our commercial interchange and speaks to us in a war whose center is in Europe, whose circle takes in the world.

Ratzel in showing how Christianity conquered its realm not as direct from Palestine, but as modified on its way through Egypt, Greece and Rome, has given us a good example of such compounding of environments.[17] Geographers have by no means been blind to the difficulty of anthropic problems. Brunhes warns us that truth in geographic relations of man is approximate, and that to claim it as exact is to be unscientific.[18]

> The outstanding psychological fact then is the antithesis of a rigid fatalistic determination of human acts by climate and soil.[19]

And he then cites what he calls "antinomies," frontier, urban, racial and social. Ratzel has a most instructive passage on sources of error due to the neglect of middle members lying between visible workings and their remote causes, the inclination to take a direct line instead of the roundabout way of mediate working causes. This

[14] L. F. Ward, "Pure Sociology," 17.

[15] F. Boas, "The Mind of Primitive Man," 84–88.

[16] R. R. Marett, "Anthropology," 122–23.

[17] "Anthropogeographie," I., 175.

[18] J. Brunhes, Inaugural lecture, *Scot. Geog. Mag.*, 29, 362–63.

[19] *Ibid.*, 367.

leads either to false results or to the hopelessness of reaching the truth.[20]

Professor Myres in the closing lines of his little book, "The Dawn of History," admits and emphasizes the vagueness of results in trying to estimate the relations of history, geography and biology. But his final word is of good cheer,

> If the reader is moved to complain with that other, "I see men as trees walking," let him remember that he who said that, was well on the way to "see every man clearly."

Thus far our notice of our difficulties has been general. Let us look at the questions of race. "Race is the key to history—what is the key to race?" Thus Griffis inscribes the title page to a volume on Japan. In estimating the force of a given environment on a given time how much shall we allow for race? But we must go back of that. How did environment go into the making of race? But suppose we are not sure what a race is and can not with any agreement analyze and classify present races! Authorities agree neither upon race, nor upon the efficiency of race in relation to environment. Thus one authority assigns a race cause for the higher status of long heads as compared with broad heads in certain parts of France. The long heads have more wealth and pay more taxes than their brachycephalic countrymen. Is this really a racial result? Or is it due to a fortunate occupation of richer lands, bringing in its train the higher professional and social status and the urban tendencies of the northern blonds? The criteria of necessity and universality need to be pressed home.

The present writer has difficulty, being a layman, in understanding the ethnologists when they classify races. It is increasing to one's comfort therefore and saving to self-respect to find a member of the anthropological fraternity saying of the development of races that it is "immensely difficult to separate the effects of various factors," and that, "it is not edifying to look at half a dozen books upon the races of mankind, and find half a dozen accounts of their relationships having scarcely a single statement in common. Far better to face the fact that race still baffles us almost completely."[21]

We may add a further observation, that much in this field depends upon paleography, if we are to decipher the origin and migration of races. But here, as Marett says, is a rather kaleidoscopic science, for the continents and bridges which it calls up out of the ocean have a way of crumbling.

Let us illustrate by the so-called Aryan question. It used to be an item in the ethnological creed that most European peoples using languages of cognate features came thither from central Asia by the way of India. But many years ago now it was shown that common language did not prove race kinship. Nor do names of trees and other plants suffice to trace migrations, for men change the names of their trees, and floras migrate in the long marches of time. It has been remarked that if we had no historical knowledge to the contrary, *tobacco* and *potato* might be taken as parts of a European tongue, rather than a loan from the Caribbean natives.

So come the measurer and the calipers in place of the linguist and set up the physical criteria of head form, stature and color, and put in place of a comfortable and discredited generalization the chaos of opinion which is often the precursor to more fixed and defensible conclusions. But such conclusions have not yet been reached. So uncertain is the status of the problem that one writer on the sources of the Germanic invasions says that while some put the origin in Africa, others trace racial dif-

[20] "Anthropogeographie," I., 54.

[21] R. R. Marett, "Anthropology," 61.

ferences to environment and others fall into skepticism about the whole matter.[22] This author thinks the Germans are diverse, as a Roman might be anything from York to New Carthage, Corinth or Damascus.

Brinton holds that the origin of this so-called Indo-European group was in the west, the central Celtic tribes moving from the Atlantic region through the Alps to the Danube, a southern series of offshoots peopling the Mediterranean, and the northern, moving southward and eastward from primitive seats on the North and Baltic seas:[23] Another authority thinks with Sergi and Keane that the Mediterranean stock came from Africa and that the dolicho-blond developed after the passage to Europe and the initiation of the Mediterranean water barrier.[24]

Ridgeway,[25] on the other hand, makes two non-Aryan races in Europe, Alpine and Neolithic, overrun by two Aryan races, once thought to have come from Hindu Kush, now believed to have originated in upper central Europe. He argues that to follow Sergi in making the Mediterranean race non-Aryan "leaves out of sight the effects of environment in changing racial types, and that too in no long time." He cites the cases of the Boers in Africa and of New World natives changing their latitude. There was gradual change from the short, dark men of southern Europe to the tall blonds of the Baltic. This means more than intercrossing and raises suspicions of constantly working climatic influence. He thinks environment the chief factor in stature and pigmentation. Attention to other animals, in Ridgeway's view, demonstrates this doctrine. He cites the white hares and bears and the tendency of the ptarmigan and the horse to turn white in winter. The horse is cited as shown in varieties from northern Asia to the Cape of Good Hope, and this writer concludes that environment is powerful not only in colorations, but in osteology, and that these changes may be very rapid. The blond Berbers are believed to owe their qualities not to mixing with Vandals and Goths, but to being cradled in a cool mountain region. The fair-haired people have poured for centuries across the Alps and yet hold their own only in the north of Italy. Woodruff does not think they were darkened, but that natural selection eliminated them because they went beyond their latitude range. *Homo Alpinus* is held by different authors as Aryan or as Mongolian from Asia, and as having evolved their brachycephalic character on European soil.

Marett, referring to Ridgeway, thinks he overrates environment, but admits it as premature to affirm or deny that in the *very long run*, round-headedness goes with a mountain life.[26]

To add other items of opinion, confirming the conviction that much fruit has set, but few specimens have ripened, Marett places in north Africa the "original hotbed"[27] of the Mediterranean race, who in Neolithic times colonized the north shore of the Mediterranean and passed by the warm Atlantic as far as Scotland. The same author, keeping close to cover, says that it is now fashionable to place the Teutonic home in northeastern Europe, though he regards it as still something of a mystery. The Scandinavian origin of Euro-

[22] C. H. Hayes, "Sources of the Germanic Invasions," Studies in Hist. and Pub. Law, XXXIII., 14–15.

[23] D. G. Brinton, "Races and Peoples," 151–52.

[24] "The Mutation Theory and the Blond Race," *Jour. Race Devel.*, III., 491–95.

[25] Wm. Ridgeway, President's Address, Brit. Assoc. Ad. Sci., Dublin, 1908, 832–47.

[26] Marett, "Anthropology," 107.

[27] *Ibid.*, 104.

pean peoples is held by some[28] while J. L. Myres shows the affinity of boreal and Mediterranean man and suggests their Euro-African origin,[29] and Gray's discussion of Myres's paper emphasizes the swift action of environment.[30]

Altogether it is hardly to exaggerate to say that you can find authority for placing the breeding grounds of the European peoples in north Africa, in central Asia, or in any part of Europe, for sending their wandering progeny in any direction of the compass, with any kind of racial mixture or linguistic evolution and with every possible shade of efficiency or inefficiency on the part of environment.

But suppose the Aryan business cleared up, there would remain earlier problems of Paleolithic differentiation and the prolonged twilight journey of man. And suppose we had threaded our way, geological, ethnographical, linguistic, and geographic, down through the differentiations and mixtures and migrations until we have the Teuton and the Celt in north Europe and the British Isles, are our troubles past? Let us see.

You would trace the evolution of the American, as effected by environment. Where will you begin? Not in New England or Virginia. Not altogether in old England. Not altogether in Teutonic Europe. Before we got through with the American we might like to cover all Europe with the network of our inquiry. But we can not move too broadly; let us turn to the British Isles. There are still the progeny of the pre-Celts of Neolithic age. There came at least three types of Celt, the Gael, the Briton and the Belgæ. Roman invasion and rule followed and in due time the Christian religion. Next came the Angles and Saxons and Jutes from across the North Sea, a new deluge of paganism, and a new contribution of racial traits bred in the long past. One would like to know how that old North Sea Teuton differed, fifteen centuries ago, from the Baltic Sea Teuton of the Prussian plain. Was it in the latter's great strain of Slavic blood, or were there other factors. When and where did the present sum of difference between Prussian and Englishman begin to emerge? At any rate, Jutland, Schleswig-Holstein and the lowlands of the Elbe were poured into our ancestry and were Christianized.

In the eighth century the Viking rovers came across the North Sea, with fresh cargoes of vigor and paganism. The Rhine, Scheldt, Seine and Loire as well as Britain felt their power. "From the fury of the Northmen, save us, Lord," runs an old litany. But pirate and robber though he was, here was an element of selection that must not be disregarded. Norway, Sweden and Denmark, says Greene, "were being brought at this time into more settled order by a series of great sovereigns, and the bolder spirits who would not submit to their rule were driven into the seas and embraced a life of piracy and war." But there had been bred into them "in a land that is one third water and one third mountain, where winter lasts six months in the year, endurance, ingenuity and daring."

In two or three centuries more followed the Norman Conquest, in which the Viking brought to England all that he had taken on and taken in of French life. There follows the further coordination of Neolithic, Celtic, Teutonic and Norse men for five and a half centuries, until the early decades of the seventeenth century and the beginnings of British settlement in America. And this was a selective migration whose story can

[28] Richard, "History of German Civilization," Ch. II.

[29] J. L. Myres, "The Alpine Races in Europe," *Geog. Jour.*, 28, 537.

[30] *Ibid.*, 555–56.

not be told here, and has never been so fully told as the student of environment might desire. Suffice it to add that no mere paragraph can tell us what kind of people came to Massachusetts, or Virginia. Religious, economic and political changes in England, plus the attractions of a fresh world, brought across the sea the elements that have been formative in American life. American environment has not developed all the qualities which we consider as distinctively or typically American.

But in New England, and on the Hudson, the Delaware and the James, new physical and social pressures began to wield their power. After some generations in this environment in the eighteenth century, a new flow began through the passes of the Appalachians. To Timothy Dwight is ascribed the view that thus New England was rid of her restless and insubordinate spirits. Another interpretation is that the best and most progressive men went because they did not like the rule of the Congregational clergy. At any rate, it was another selective migration, by which picked families went into a new environment. Turner is our best authority for what the environment of the middle west made out of the emigrant from the East. It would be easy to show, I think, that in spite of what might seem predominating mixtures of Continental European migration, New England still pervades Wisconsin, that the New England mind was more powerful than the new environment, important as that was, just as the Puritan mind was more powerful than the New England environment.

The selective emigration moved on by prairie schooner and transcontinental railway to the Rocky Mountains, the intermont plateaus and the Pacific Coast. Here are mountains, deserts, mines, giant forests, irrigation and a new ocean. Whence came the Californian? From New England, Ohio, Iowa, Kansas, Colorado. Is that all? Every one of the following regions is there, with 5,000 to 200,000 representatives. Germany, Ireland, England, Canada, Italy, Mexico, Russia, Scotland, Sweden, Switzerland, Portugal, Norway, France, Denmark, Austria, Wales, Turkey, Spain, Greece, China, islands of the Atlantic, Australia. The German, Canadian, Englishman, Spaniard and Russian that wanted to be or do something new are there. And it is a compelling environment, of sky and mountain, ocean and plain, forest and desert, mine and field. Professor Royce, a native Californian, thinks the typical character there is a combination of strength and weakness, with wandering in the blood, lack of social responsibility, recognition of no barriers, desire for sudden wealth, love of difficulty, unaccented love of home, with more love of fullness of life than reverence for the relations of life.[31]

One more picture of this western life must here suffice—it is by a journalist—of the American of the far northwest, where New England and the *Mayflower* appear not, whose men followed the Missouri from Kentucky, Indiana, Missouri and Arkansas, tall, big-boned, and stalwart, self-assertive, nervous, quick in action, acting before they think and thinking mainly of themselves, their European origin so far behind them that they know nothing of it. Their grandfathers had forgotten it. In a word they are distinctly, decidedly, pugnaciously and absolutely American.[32] Making what allowance you will for Ralph's exuberant rhetoric, and Royce's habit of philosophizing, better to be solved in the twenty-first century than to-day is the

[31] J. Royce, "California," Am. Com. Series, 499–500.

[32] J. Ralph, "Our Great West," 141–42, quoted in abstract.

problem of the function of environment in shaping American life. As we have seen in this sketch, the geographer will not work alone, the historian, sociologist and philosopher will take a hand.

It's a long way from the primitive man to the differentiation of the white race, from the white beginnings to Briton, Anglia, Norway and Normandy, from Anglia and England to California and Puget Sound. Along this ancient and devious path our ignorance of the inner laws of human development is appalling. We see man, and earth, something called race, race continuity, one physical environment after another, human environments with innumerable mixtures of blood, in infinitely various compounds, in the grand march of humanity to one world center after another. The result, to carry out our illustration still, is the Pacific coast man, domestic, industrial, political, social, moral. It will take cautious steps and many torches to pick our way back along the road by which he came.

Let us take another example in emphasis of the difficulties which beset us—an analysis of the causes of Japanese character. Mental alertness has been asserted to be the chief trait of the Japanese. This must have originated in accordance with biological laws, in spontaneous variation, in mixture of races, or in environment, or we might add, by a combination of these. It is tentatively held that however this quality arose, it has been preserved by environment: first, by insularity, giving familiarity with the sea, saving from wars, intermixtures and invasions, in distinction from a continental land, like China; second, by physical features, affording small areas of cultivation, promoting industry, a land of such richness as to give certainty of reward, without drought or flood to destroy the prudent as well as the thriftless. Third, there comes climate, following a supposed law that the progressive lands are in the cyclonic domain of the Temperate zone.

This seems simple, interesting and suggestive, but is it true? Is mental alertness the chief trait in Japanese efficiency? Droppers, sometime professor in the University of Tokyo, thinks the secret of success is in the structure of society, devotion to family life, or to tribe and nation, the corporate versus the individualistic.[33] Dyer emphasizes community but denies that the main ability is in imitation. Loyalty and intellectual ability are the basis of achievement. Another authority marks the Japanese as sober, intelligent, enduring, patient, industrious, polite, skilful, ready to assimilate, not devoid of original genius.[34] Yet another says he is patient, persistent, cheerful, versatile, quick-witted, enterprising, original, imitative, progressive, industrious, artistic, humorous, cleanly, polite, honorable, brave, kind, calm, self-contained.[35] Whether any good human qualities have been left out of these catalogues, we do not know, but we are at least left in doubt as to what the main national trait is.

But suppose it is mental alertness. Would insularity make it or keep it? Miss Semple avers that insularity breeds conservatism, a quality that does not seem to be indissolubly tied to alertness. Insularity may give familiarity with the sea, but perhaps not greater than is true of the Dutch, who are not insular, and we do not think of the Dutch as distinctively alert. Insularity has not kept Japan free from invasion, though there have been periods of seclusion. And the modern Japanese are

[33] Garrett Droppers, "The Secret of Japanese Success," *Jour. Race Devel.*, II., 424.

[34] V. Dingelstedt, "Ruling Nations," *Scot. Geog. Mag.*, 27, 305.

[35] Writer in New Inter. Ency., Art. "Japan," 335.

"a very mixed people," Mongolian, Caucasian, Malay, and some say an infiltration of Negrito. If insularity breeds alertness, what other factors have apparently swamped this tendency in Madagascar, Iceland, Sicily, Cuba and Hawaii?

Nor can we be sure of the effect of small areas of rich cultivation and certain reward. Industry we can predict and a degree of comfort, but can we say more? Why not as well expect the Belgian farmer or the farmer of the Paris basin, or of the county of Norfolk to be mentally alert? Moreover, most Japanese are in a low state. "We imagine them" (the Japanese) "as intellectually homogeneous," but there are "five million highly cultivated people and nine times as many of lower type . . . the mighty mass still pagan, stolid, low in the scale of evolution."[36]

This little empire is indeed a good place in the temperate zone, and so are China, Switzerland, Spain, Austria-Hungary, Germany, France, and too many others to make the criterion of distinctive value. The inference for precise, detailed and prolonged research need not be elaborated.

We have already spoken of certain related sciences as supplying motives to the human geographer. We turn now to examine the geographer's proper sphere of activity in relation to these sciences.

Our references to the race problem might seem superfluous, for if this field belongs essentially to the anthropologists, what right has the geographer there? Here we seem at once to need a definition of geography. But the present writer will not try to go where angels have trod with devious and faltering steps. Some time we shall have a definition of geography, but not now. Meanwhile we have enough to do, and if we are reviled as devotees of patchwork, as having no real science, we bear it with serenity.

I do not know of any one who proposes to rule us out of the human sphere and shut us up to the physical. If I can get my foot on what Brunhes calls the "Humanized surface"[37] of our planet, I am content. I shall have enough to do without quarreling with my neighbor, or resenting anything he may say to me. Brunhes also says that we are where roads meet, with facts from many sources, that we must not be a bazaar for retailing everything, but have our own domain and commit no trespasses. What the limits of this field are is not so clear, but why trouble about it, when no science has a fenced domain?

Ratzel makes a sweeping criticism of Buckle when he says that *evolution* is unspoken by him.[38] The great geographical philosopher of Leipzig made it forever imperative for us to "go back into the past." He speaks of differentiation, of bequeathed influences, of the migration of developed traits—he never lets you doubt that he is moving into the realm of Darwin. So the geographer, if he touches man at all, and the more if he opens the question of geographic influence, must be in daily contact with the principles of biological evolution, so far as the specialists have mastered them. I will not try to say how far he may supply useful data to the biologist; sure it is that human anatomy, physiology and psychology must be relied upon for light on the early (as well as late) stages of mankind. Should not this field be turned over to the anthropologist?

The first answer is that so far as environmental factors are concerned, the geographer alone is responsible for the knowledge of the total physical complex which the earth affords. But when this compre-

[36] W. E. Griffis, "The Japanese Nation in Evolution," 271, 386, 389–90.

[37] J. Brunhes, *Scot. Geog. Mag.*, 29, 313.

[38] "Anthropogeographie," I., 97–98.

hensive survey of the physical geography has been supplied, do not the geographer's duties, and even his rights, cease? If so, and if we must leave the action of environment to the anthropologist, to what kind of an anthropologist? The somatologist perhaps. The somatologist studies the natural history of the body. This is highly important, but it is only one point of view. He also studies man in his physiological development, but this is also partial. Your anthropologist may be primarily a psychologist, a philologist, or a student of early arts or of comparative religion. Or he may be an ethnologist studying the physical features, mental traits, linguistics, practical arts, legends and religions of a single tribe or people.

To which one of these will you look for a world view of the influence of environment on early or half-developed man? For your answer go through all the reports and books of the anthropologists, rich as they are, and tell me the result. In the nature of the case, the anthropologist, even if he could command all the departments of his own science, is not in a position to organize the principles of the influence of an earthwide environment on man. He offers indispensable materials and he may find other unities in his field but the inclusive bond of world environment belongs to the geographer.

Suppose we say that we do not need anthropologists because there are anatomists, physiologists, psychologists, philologists and students of art and religion. The answer is that anthropology aims at the natural history of man as a whole. The specialists work indeed too often in small and isolated fields and not always with the causal and comparative principle in full view. But man, the bond, is there, and the science receives its justification. In like manner, why should there be geographers, for there are geologists, meteorologists, oceanographers, astronomers, botanists and zoologists? We say because there is no other to organize the data of all these sciences in relation to the whole earth, as we see it and know it.

Taking the like case—there are anthropologists of many sorts, historians of several kinds, sociologists, economists and technologists in ample variety. Why a human geographer? Because there is no other to exhibit the human kind (not now but in some coming day) in its causal and distributional relation to the earth and its forces viewed as a unity.

Professor Adams in his presidential address before the American Historical Association manifests a little concern because of the entrance of political science, geography, sociology and certain other subjects into the arena.[39] But history, conceived on the modern scientific basis, opens so vast a field that collaborating sciences may well be welcome in the task. Equally may the geographer rejoice that every science of man contributes to his own and that he in turn has something to share.

There need be no hoarding of opportunity, where opportunity is infinite and no quarreling over line fences where none can exist. Professor Turner, referring to economist, geographer, sociologist and other fellow-workers, has thus broadly expressed the true attitude of the historian:

> The historian must so far familiarize himself with the training of his sister subjects that he can at least avail himself of their results and in some reasonable degree master the essential tools of their trade.

No one would accuse Professor Turner of advising over-expansion or superficial endeavor, but he seems to think it possible to be a historian and something more, by virtue of which to be a better historian. So say we of the geographer. Let him be

[39] *Am. Hist. Rev.*, Vol. 14.

"familiar with the whole earth," as demanded by Ratzel,[40] not in detail, but broadly familiar with causal principles and their regional illustration. Then let him know the methods and results of history, or of sociology, or of anthropology, or of some phase of one of these. Then he can cooperate in that study of environmental influence which must be common ground for all.

All this has its bearing on the higher education, for every human geographer should have his minor studies in some other science of man, and no young historian should be allowed to escape who is not grounded in the principles of physical geography and who has not looked through the geographer's eye at the impress made by nature on man.

Sociology is a science which equally with geography has aroused skepticism concerning its right to be called a science. Be that as it may, its devotees occupy ground which stretches into historical territory, on the one hand, and geographical and anthropological on the other. This is conceded by Small.

> The comprehensive science has the task of organizing details which may already have been studied separately by several varieties of scholars.[41]

The same author sets forth the influence of nature with an emphasis which if used by the geographer might call down a charge of excessive claim.

> Nature sets our tasks, and doles out our wages, and prescribes our working hours and tells us when and how much we may play or learn or fight or pray. Life is an affair of adjusting ourselves to material, matter-of-fact, inexorable nature.[42]

Small does not think we yet have an adequate story of the operation of cosmic laws in determining the course of human development.

Mr. E. C. Hayes, in a paper in the *American Journal of Sociology*,[43] discusses the relation of geography to sociology and the definition and scope of geography. He seems disposed to think that stating the effects of geographic conditions on social phenomena will be an integral part of sociology, but thinks

> it will still remain true that no science but geography describes the regions of the earth by bringing together into one description all the various facts separately studied by the different sciences.[44]

It is fair to say that only the geographer can know the physical conditions in a broad and deep way. It is just as fair to expect the sociologist to be superior in the strictly human field. But neither can dismiss the other, nor prescribe a legitimate boundary line of research. And there is always the possibility of a genius equally at home in both fields, scorning all petty frontiers of our so-called sciences, fusing and recreating the data and conclusions of lesser men, and recording for all time those large generalizations of which we dream and for which we strive.

After all that can be said on the relations of geography to other subjects, I am content to come back to a confessedly general, but safe and truthful word by James Bryce.

> Geography is the point of contact between the sciences of nature taken all together and the branches of inquiry which deal with man and his institutions.

I think it is a sociologist, Ward, who likens the progress of science to the progress of a prairie fire. No doubt he means that it moves irregularly but surely. The figure is not altogether good, as indeed no figure is, for we do not move with a rush, neither

[40] "Studies in Political Areas," *Am. Jour. Soc.*, 3, 302.

[41] A. W. Small, "General Sociology," 7.

[42] *Ibid.*, 408.

[43] Vol. 14, 371–407.

[44] *Ibid.*, 400.

does our going leave a zone of destruction behind. Our work is constructive and slow. Whether the worker be a geographer or bear some longer name, is not material. If he have no name at all, let us accept his fact, his principle, in good faith that as workers and half-thoughts come and go, the body of truth gathers volume, order and power.

We come now to the last phase of our discussion, the most important and difficult of all—lines of investigation. What is our present status? It would be a good work if some one would review historically the progress of the idea of environmental influence. Here the barest sketch must be the preliminary to our inquiry.

We may pass by the fragmental notices of ancient and medieval writers. Modern seed thoughts are not uncommon, and some harvest could be gathered from the philosophers and literary writers, Hobbes, Montesquieu, Kant, Herder, Hegel, Comte, Taine, and others. Humboldt, Ritter and Guyot laid the foundations of our modern human geography, and then came Darwin, pointing the road to fruitful study for all the sciences of organic nature and of man. Ratzel, in the spirit of Darwin, kept the unfolding of geography abreast of the progress of anthropology, history and other human sciences in the last half century, and now Miss Semple has placed all geographers in her debt in the expansion and precision which she has added to the work of Ratzel.

General works of lesser scope, some of them regional, have appeared in this country and in Europe. Mackinder, Herbertson, Lyde, Chisholm, and others in Great Britain, and Vidal la Blache, Brunhes, Partsch, Penck and many others on the continent, have made important contributions. Already we have a large and rapidly growing list of small monographs dealing with limited phases or regions in this country. In America this work is largely the achievement, direct and indirect, of the members of this association, and the present program is sharp evidence of the force of an impulse that has gathered power among us during the ten years of our cooperative endeavor.

My first hint is in the direction of climatology in its relation to man.[45] Here is a new science, with a growing body of observation, generalization and record, made available in description and in maps. Climatology is beginning to be appreciated in relation to other fields of physical geography. We begin to value and to express in text-books the relation of the atmosphere to the origin of land surfaces, glaciers, aridity and the waves and currents of the sea. We see its functions also in relation to the mineral contents of the earth, and in relation to the origin and use of soil.

Even more pronounced is the growth of ideas in relating the atmosphere to fauna and flora, to plant and animal types and societies, to bacteria, and to forests, steppes and deserts. Involved in all this relation to the inorganic and organic world is an immense indirect influence on man.

There is also direct influence on man, through temperature, varying constitution, variations of pressure, moisture content, movements, optical effects and sound waves. And we can not stop short of psychical, social and economic phases of influence, all tangled in difficult fashion. When the consumptive goes to Colorado for help, and finds it, what has accomplished the result? Is it rarity and increased lung expansion? Is dryness and a non-relaxing quality uppermost? And how much is due to new hope, new effort, fresh scenery, new and glorious land forms, clear skies, gray desert and new social environment? Let

[45] J. Brunhes, *Scot. Geog. Mag.*, 29, 312; C. R. Dryer, *Jour. Geog.*, Feb., 1913, 178; Ratzel, "Anthropogeographie," I., Ch. Das Klima.

us move, but move cautiously, heeding Professor Ward's emphasis on doubtful elements in the relation of climate to disease. Perhaps there is no subject, unless it be politics, on which men say so much and know so little as about climate.

Geography has a considerable body of good knowledge of climate in relation to modes of living in typical parts of the world. We know that the Eskimo is carnivorous, the tropical savage vegetarian and that the denizen of temperate latitudes brings both foods to his table. We know the climatic results in clothing and shelter, in nomadic and pastoral, agricultural and static life, and among hunters of the forest. These are all important, but more or less indirect climatic effects, so well set forth by Herbertson in "Man and His Work."

But what of direct effects of climate? I hesitate to use the word direct of such activity. Such is our ignorance of the precise efficiency of these forces, that apparent direct agents may turn out to be mediate, after all.

How much exact knowledge have we in the field of coloration? Grant that this is mainly a physiological problem, so far as man is concerned, will it ever be solved, and the results broadly stated except in collaboration with geography?

> Color almost certainly developed in strict relation to climate. Right away in the back ages we must place the race-making epoch, when the chief bodily differences, including differences in color, arose amongst men.

This is from Marett and he adds that natural selection had a clear field with the body before mind became the chief factor in survival.

Now, how much is definite here? What is this "strict relation" to climate? And what element of climate does the work? Is it heat, or light, or moisture, or a combination of these? What does each climatic factor do, and does it do what it does, independently, or by the aid of some non-climatic factor? Why is the Malay brown, the Chinaman yellow, the American Indian coppery and the negro black? And how do the osteological features and the facial features correlate, if at all, in origin, with the color? Here is a vast field. What, of assured answer, is on record?

Brinton says that climate and food supply are the main causes of the fixation of ethnic traits. He adds that temperature, humidity and other factors bear directly on the relative activity of lungs, heart, liver and skin. This seems to come near to the core of things, but no precision is reached and I suppose can not be in the present state of knowledge. Ratzel was not wrong in citing the negro's dark skin as illustration of the fact that the search for causes goes after hard and deep-rooted things.

The study of the races of Europe teems with conjectures about blonde and brunette, but the physiological basis is wanting. We should like to know whether the Mediterranean longhead is a darkened Teuton, or whether the Teuton is a bleached African. Here is joint work for physiologist, anthropologist and geographer.

Ward notes the fading of hair, beards and skins of polar explorers.[46] The same author, leaving open the origin of color, quotes Darwin on the accumulation of color through natural selection and contents himself with the assured fact that color, however obtained, is an advantage in a hot climate. This field therefore is almost unworked. I hesitate to say that the door for research is wide open, but one would hesitate even more to believe that the problem can not be solved.

Suppose now we leave these primitive and racial puzzles and come down to possible effects of climate that can be seen and registered in a few generations, if there be

[46] R. DeC. Ward, "Climate, Considered Especially in Relation to Man," 216.

such effects. Here is the question of acclimatization and tropical disease, in short, of the white man's burden.

Here again Ward proceeds with instructive caution. It is a complex subject, he says, conclusions are contradictory, curves may be made to show anything. There are many weather elements and there are many other factors, such as sanitation, foods, water, habits, altitude, soil, race, traffic and other controls. Microorganisms intervene to make climate largely an indirect influence.[47]

Thus we have a group of problems for the medical observer, but either in him or with him must the geographer share the task whose successful accomplishment affects the destinies of every colonial empire and the ultimate place of the white race. Brinton speaks of the hopelessness of the problem,[48] and Ripley recognizes the importance of it by criticizing Ratzel for inadequate attention to it in the second volume of the "Anthropology."[49] We have an interesting discussion in Woodruff's "Effects of Tropical Light on White Men." It is for a more competent hand to estimate its value. Some of its generalizations seem too sweeping and too easy to be true. Altogether in this whole field, a field of high practical importance, there has been much sincere effort, but no great harvest.

We want narrower fields of investigation and better proven results. Only thus will be gathered the data for great generalizations. In this direction we may cite a passage of Hahn on the physiological effects of diminished pressure,[50] and the studies of E. G. Dexter and H. H. Clayton on the sociological effects of climate.

Let us look at the field of biogeography in relation to man. The distribution of plants and animals as forming large elements in environment can not fail to involve man and to uncover many interesting relationships. This study is now in a hopeful state of vitality and progress. Our own association has a good number of workers in this field.

A wealth of pertinent facts awaits discovery and coordination as regards the coincident distribution of man with plants and animals. Payne, in the history of early America already cited, uses this as a basal principle, showing the migration and presence of organic forms in causal relation to man. Here again, Ripley finds occasion to criticize Ratzel for insufficient attention to the theme. A few suggestive illustrations may be given. Kirchoff in his "Man and Earth"[51] coordinates the Mediterranean spread of the Phœnicians with the occurrence of the dye-yielding mollusc. Dr. C. Hart Merriam once surprised the writer by saying that the beaver was the most important fact in early American history. The more one considers this the less one is disposed to consider it as an outburst of a biologist's enthusiasm.

In Hansa days tens of thousands of people dwelt in the Peninsula of Schonen, in the towns of Falsterbo and Skänor, at the most southwestern tip of Sweden. To-day an old church, a few cottages and a summer hotel make up Falsterbo, while Skänor is a sleepy village of a few hundred people. Why should this throbbing Baltic market of centuries ago have suddenly declined to insignificant shore villages? Because the herring migrated to other waters. A new harbor has been built at Skänor and it will be seen whether modern conditions can restore the prosperity which the runaway fish destroyed.

Dr. Scharfetter in a work on the dis-

[47] "Climate," 180 et seq.

[48] D. G. Brinton, "Races and Peoples," 278–83.

[49] W. G. Ripley, *Pol. Sci. Quar.*, IX., 323.

[50] J. Hahn, "Handbook of Climatology," trans. by Ward, 224 et seq.

[51] Trans. of "Mensch und Erde," 30–31.

tribution of plants and man sets the Roman boundary in Germany at the edge of the Franconian forest and cites the fact that the Arabs went wherever the date palm would grow.[52] The practical biologist, such as the agricultural explorer, turns the problem around, shows how to control the distribution of lower life and thus to modify the distribution of man.

Such results must flow from the work of the department of botanical research of the Carnegie Institution, and Dr. McDougal of the Desert Laboratory well sets forth the interrelations of the sciences when he likens the work to the making of a cantilever bridge whose further ends may rest on chemical, physical, geological or geographical piers.[53] A good illustration of this finds immediate place in the investigations by Professor Huntington, in western forests, of climatic events.

The climatologist asks for definite climatic effects on man. The ethnologist or sociologist finds traits in man which might have a climatic origin. The geographer wants all that all types of specialists can give him, both in the physical and psychical spheres. Thus we may approach from the point of view of causes or of results and follow down or up the stream of effects.

We have made a hasty survey of two fields of causation, the one physical, the other organic. Let us turn to certain groups of phenomena in the realm of effects or results. The most important and surely the most baffling problems here are in the psychic field. Here the geographer will be peculiarly dependent on workers in sister sciences and the gap may be hard to bridge. Geographers are not as a rule specialists in psychology, and there is no reason to believe that many students in psychic fields are specially versed in geography. If we can offer a stimulus which shall lead these kinds of scholars to struggle up the stream of causality, it may be safer than for us to drift down through rapids and among rocks. But the work ought to be done, and the geographer can at least show its worth and encourage the doing of it.

In this research we are not to think that the earth was all powerful with early man, but is helpless to-day. Color or other race features may have been fixed, but this is not all. If there is something in man that is found in every man, wherever he is, he is not thereby released from the pressure of environment. Psychic reaction on nature does not destroy nature's efficiency, but in a degree directs, refines and uses it. When Professor Lester F. Ward says that "the environment transforms the animal, while man transforms the environment,"[54] he utters but a partial truth. Perhaps he was attracted by rhetorical form, for in a later passage he recovers himself, recognizing the psychic effects of environment, for,

> Courage, love of liberty, industry and thrift, ingenuity and intelligence, are all developed by contact with restraining influences adapted to stimulating them and not so severe as to check their growth.[55]

If a hard winter is a "great Teutonic institution," if rains, dark skies and winter have made more serious peoples in the north of Europe than are found along the Mediterranean, if Geikie rightly ascribes the heart of Ossian's poems to nature in the West Highlands,[56] these qualities of environment are pressing on the human spirit to-day as in Neolithic or Celtic time, moderated, perhaps, by modern skill in getting protection from nature, and by greater contact with all the world. We will not deny the assertion of Thomas that "the force of climate and geography is greater in the

[52] Paper is noticed, *Scot. Geog. Mag.*, Vol. 27, 39–41.

[53] An. Rep. of Director, 1912.

[54] L. F. Ward, "Pure Sociology," 16.

[55] *Ibid.*, 58.

[56] A. Geikie, "Scenery of Scotland," 407–08.

lower stages of culture and that ideas play an increasing rôle," but we do not know on what ground he makes the further claim that the peculiar cultures of Japan, China and India were in the first place the results of psychic rather than geographic factors.[57]

There is a beautiful passage in Ratzel which I now commend to those historical and sociological philosophers who think that psychic qualities and powers are released from environmental influence. If ethnographers utter the view that the development of culture consists in ever wider release from nature, we may emphasize that the difference between nature and culture folk is to be sought not in degree, but in the kind of this connection (Zusammenhang) with nature. Culture is freedom from nature not in the sense of complete release, but in that of much wider union. The farmer who gathers his corn in the barn is really as dependent on his ground as the Indian who harvests in swamps wild rice which he did not sow.

> We do not on the whole become freer from nature while we deeply exploit and study it, we only make ouselves in single cases independent of it, while we multiply the bonds.

Not to do Ratzel injustice, it is he who has also called "the spirit of man a completely new phenomenon upon our planet," and has asserted that

> No other being (Wesen) has worked so permanently and upon so many other existences as man, who has profoundly changed the living face of the earth.

We are to interpret cautiously similar human phenomena in different parts of the world. We can not here follow the evolutionary axiom that if a species of trilobite is found in England and in New York, there has been one point of origin and a migration. The same things appear in many places, either through the unity of the human spirit or the likeness of environments, or from both causes. This is stated by Fewkes,

> Identity in the working of the human mind is recognized by all anthropologists, and the tendency to ascribe cultural identities . . . to contact or migration is much less prevalent now than formerly.[58]

In like manner Boas shows that some ideas are so general that they could not have been diffused historically through migration and contact, but must have arisen independently in different places.[59]

Tylor is no less emphatic:

> Researches undertaken all over the globe have shown the necessity of abandoning the old theory that a similarity of customs and superstitions, of arts and crafts, justifies the assumption of a remote relationship if not an identity of origin between races . . . there has been an inherent tendency in man, allowing for difference of climate and natural surroundings, to develop culture by the same stages and in the same way.

Citing the pyramid-building of Aztec and Egyptian,

> Each race developed the idea of a pyramid tomb through that psychological similarity which is as much a characteristic of the species man as his physique.[60]

We leave this topic with the single suggestion that in the psychic field, a useful and difficult piece of research is open to the student of comparative religions, who is at the same time interested in anthropogeographic problems and has the needed geographic training. How far the essential content of religious aspiration and thought, as well as the ritual of worship has been influenced by environment, has, I think, never been shown in any full synthetic

[57] W. I. Thomas, "Source Book for Social Origins," 130–31.

[58] J. W. Fewkes, "Climate and Cult," 8th Inter. Geog. Cong., 670.

[59] F. Boas, "The Mind of Primitive Man," 151–64.

[60] E. B. Tylor, Ency. Brit., Art. "Anthropology."

way. It is a task of no common difficulty, not to be lightly undertaken, but worth the doing.

Another field of effects, much more accessible to the pure geographer is the distribution of population studied in the causal way. Enough practise in statistical method for this inquiry can be readily acquired and the results should be most fruitful. Jefferson's recent papers have been suggestive in this field of research, which involves in intimate combinations, physical, economic, racial and social conditions. Akin to this study is the classification of towns and cities, developing the principles of origin, growth and differentiation, as in a recent valuable paper of Chisholm. The city as a geographic organism may be freely taken as an inexhaustible theme.

Another great sphere lies in regional studies, such as states, physiographic units, and countries. The number of such studies, maturely developed, now available may perhaps be counted on the fingers of one's hands. The aim should be not alone directed upon the more obvious matters of route and industry, but also upon deep and underlying principles. What rich and alluring subjects for the intensive student would the state of Pennsylvania offer, of Kentucky, Minnesota or California! Who will develop for us our coastal plain or piedmont, treating town sites, roads, soils, crops, industries, racial composition and social status? Who will do a like work for the great Appalachian Valley, that magnificent and little understood unit of our east—its trails and roads, its agriculture, towns, migrations and historical significance in colonial and current life? There is room for more such studies as those of Whitbeck upon glacial and nonglacial Wisconsin and of von Engeln on the effects of glaciation upon agriculture.[61] The latter, indeed, is not regional except as it naturally deals largely with principles as illustrated in our own country.

Will Mr. Mackinder, or some one else, take up Great Britain, omitting the purely descriptive, as he could not in Britain and British seas properly do, and discuss more fully questions of geographic influence as regards agricultural distribution, the localization of industries, the distribution of population in general, and the effect of various factors such as insularity, climate and world position in the development of British character, British political unity, and British social conditions.

Or in the United States, there are racial compositions, new physical environments, offering new social and economic conditions to population groups as seen in comparison with conditions in the parent lands of Europe. Finally, there are innumerable beckoning fields, of a small and local sort, out of whose diligent study general principles will rise and become established.

Our goal is broad generalization. But the formulation of general laws is difficult and the results insecure until we have a body of concrete and detailed observations. Quoting Brunhes,

> We must then make up our minds to put aside generalities and vague analogies between nature and man. We must make it our business to search for facts of interaction.[62]

From Boas also,

> It goes without saying that haphazard application of unproven though possible theories will not serve as proof of the effectiveness of selection or environment in modifying types.[63]

Detailed investigation of single problems, in small and seemingly unimportant

[61] O. D. von Engeln, "Effects of Continental Glaciation on Agriculture," *Bull. Am. Geog. Soc.*, XLVI., 241–64, 336–55.

[62] J. Brunhes, *Scot. Geog. Mag.*, 29, 311.

[63] F. Boas, "The Mind of Primitive Man," 51.

fields, must for a long time prepare the way for the formulation of richer and more fundamental conclusions and general principles than we have yet been able to achieve. We should not wait for some one to state or demonstrate these laws. This is yet, even for a genius, impossible. We must contribute in partial, microscopic, sometimes unconscious ways to the emergence of such laws.

Professor Adams, speaking of the available and most useful tasks of the historian, has a word which is equally good for us,

> To furnish materials, to do preliminary work, is to make a better contribution to the final science than to yield to the allurements of speculation, to endeavor to discover in the present state of our knowledge the forces that control society, or to formulate the laws of their action.[64]

Not only is this a model principle, but it emphasizes the value of our goal, for the real philosophy of history will not be written until geographic factors have had broader and deeper recognition. Here I do not speak as a geographic enthusiast, nor in denial of the supremacy of the human spirit.

Such then is the mode of advance of our science—the old story of interest, hypothesis, test, correction, publication, criticism, revision; progress by error, by half truth, by zigzag, spiral and apparent retrograde; by aero-flight, by patient tunneling; some at the salients of progress, and some in the ranks of humble endeavor, the goal in front of all.

Albert Perry Brigham
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LEWIS LINDSEY DYCHE

Lewis Lindsey Dyche, professor of systematic zoology and curator of the collections of mammals, birds and fishes, at the University of Kansas, died in Topeka, Kansas, Wednesday, January 20, 1915. Professor Dyche was intimately associated with the life of the university for nearly thirty-eight years, having seen nearly every class graduated from the institution. His first connection with it was as a student in the preparatory department. He entered the middle class of the preparatory department in September, 1877, at the age of twenty years, being registered from Auburn, Kansas. James Marvin was then chancellor of the university. There were 12 members of the faculty and a total attendance of students of 361, of whom 110 were of college grade. Mr. Dyche finished the senior preparatory work at the end of the next year and in September, 1879, became a freshman in the collegiate department, enrolling as a student in the classical course. In the year 1880, however, on entering his sophomore year, he changed his work to that of natural history. He became a junior in the collegiate department in the regular course of events in September, 1881, still enrolled in his newly chosen field of natural history.

In 1882 Mr. Dyche was made instructor in natural history, but retaining his place in the junior class. He continued his connection with the instructional side of the university until his death. Mr. Dyche was graduated from the university in June, 1884, receiving two degrees, that of Bachelor of Arts and that of Bachelor of Sciences, he having combined both the classical and scientific work then offered in the university. He continued his study in natural history at the university of Kansas by entering the postgraduate course in September, 1884, receiving his Master of Arts degree in 1886 and his Master of Science degree in 1888. His teaching title was during these years "assistant," being equivalent to the title of assistant professor at the present time.

In September, 1888, he was advanced from the rank of assistant in natural history to that of full professor of anatomy and physiology, taxidermist and curator of mammals, birds and fishes. In 1890 zoology was added to his list of teaching subjects. We must remember, however, that in the nineties the number of both students and teachers was small and

[64] Geo. B. Adams, *Am. Hist. Rev.*, 14, 236.

the field of work had not been so carefully differentiated as at present. In September, 1892, physiology and anatomy were dropped from his title and he limited himself to the field which he occupied with little change until the end of his career. His title became professor of zoology, taxidermist and curator of mammals and birds. Francis H. Snow was then chancellor of the university.

It stood thus until 1899 when anatomy for a year was again put in his charge and his title of curator was that of curator of zoological collections. In the very next year we find anatomy cared for in a separate department and Professor Dyche returning to his work under the title of professor of systematic zoology and taxidermist. In 1903 the title of taxidermist was dropped as being unnecessary and Professor Dyche was given the title which he retained until his death, namely, that of professor of systematic zoology and curator of mammals, birds and fishes. In 1901 the legislature of the state, largely through the efforts of Professor Dyche, appropriated $75,000 for the erection of a natural history museum for the housing of the natural history collections. The building was finished in 1902, a considerable part of it being given over to the extensive and important collection of North American mammals and birds.

On December 1, 1909, Professor Dyche was given partial leave of absence in order that he might act as fish and game warden for the state of Kansas. This action was taken by the board of regents of the university at the request of the then governor, W. R. Stubbs. This request was acceded to for the reason that of all men in the state of Kansas Professor Dyche was the most competent in every way to carry on a large project of this character on a scientific basis. It was acceded to also with the belief which has been fully substantiated that the fish hatchery under his supervision could be put upon an economic and scientific foundation.

Since December, 1909, Professor Dyche has given most of his time to the fish and game wardenship although still connected with the university as professor of systematic zoology and curator of mammals, birds and fishes. For some years prior to 1909 Professor Dyche had done little or no undergraduate class work, confining himself to work as curator, investigator and writer, and to such occasional graduate work as was desired by students expecting to enter the museum field.

During his long career as a teacher, in connection with other university men, he took part in or conducted many scientific expeditions, twenty-three in all it is said, for the collection of museum material. These expeditions covered practically all of North America. Some of the most important were to Greenland and the Arctic regions. Of the Peary expedition and the rest it is not for me to speak. They were filled with strenuous endeavor and many thrilling experiences. Indeed few men even of bygone border times could equal his experiences in this respect. He was a noted hunter and won his place as an explorer, his talents as naturalist, woodsman, hunter and explorer being of a high order. The result of all of this was no doubt to shorten his days but he helped build up large scientific collections of great value into which he had put his life and he saw them become an integral part of the university which he loved. He was one of the charter members of the chapter of Sigma Xi at the University of Kansas. He lectured much and in this field was exceedingly graphic and interesting. He wrote much, his last writings being in the shape of bulletins in regard to fish culture in the large. These bulletins are much sought after and show the results of a life time of close observation and study. As a taxidermist he had few equals, his knowledge of the pose and habits of animals and the habitat in which they live being unusually accurate. His fidelity to nature, his great skill and his keen observation are well attested by the brilliant display of North American mammals which he was largely instrumental in preparing at the University of Kansas.

Professor Dyche had in larger degree than most men the creative instinct, the instinct

of originality. He had immense persistence and enthusiasm, well attested by his accomplishments against great odds. A mere study of his life is in itself thrilling. He leaves an honored name of which his family may well be proud. He was an extremely likeable man, a loyal son of his university who brought much honor to his alma mater.

Frank Strong

University of Kansas

THE BONAPARTE FUND OF THE PARIS ACADEMY OF SCIENCES

The committee appointed to deal with the allocation of the Bonaparte Fund for the year 1914, has, we learn from *Nature,* made the following proposals, which have been unanimously adopted by the academy:

1. 2,000 francs to Pierre Breteau, to enable him to pursue his researches on the use of palladium in analysis and in organic chemistry.

2. 2,000 francs to M. Chatton, to give him the means of continuing his researches on the parasitic Peridinians.

3. 3,000 francs to Fr. Croze, to enable him to continue his work on the Zeeman phenomenon in band and line spectra, the amount to be applied to the purchase of a large concave grating and a 16-cm. objective.

4. 6,000 francs to Dr. Hemsalech, for the purchase of a resonance transformer and a battery of condensers for use in his spectroscopic researches.

5. 2,000 francs to P. Laïs, director of the Vatican Observatory, to assist in the publication of the photographic map of the sky.

6. 2,000 francs to M. Pellegrin, to facilitate the pursuit of his researches and the continuation of his publications concerning African fishes.

7. 2,000 francs to Dr. Trousset, to aid him in his studies relating to the theory of the minor planets.

8. 2,000 francs to M. Vigouroux, to assist him in continuing his researches on silicon and its different varieties. These researches, in which it is necessary to make use of hydrofluoric acid, necessitate the use of expensive receivers.

9. 3,000 francs to M. Alluaud, for continuing the publication, undertaken with Dr. R. Jeannel, of the scientific results of three expeditions in eastern and central Africa.

10. 9,000 francs to be divided equally between MM. Pitard, de Gironcourt, and Lecointre, all members of the scientific expedition to Morocco organized by the Société de Géographie.

11. 2,000 francs to Professor Vasseur, to assist him in his geological excavations in a fossil-bearing stratum at Lot-et-Garonne.

12. 3,500 francs to Dr. Mauguin, for the continuation of his researches on liquid crystals and the remarkable orientation phenomena presented by these singular bodies when placed in a magnetic field. The grant will be applied to the construction of a powerful electromagnet.

13. 2,000 francs to Dr. Anthony to meet the cost of his researches on the determinism of the morphological characters and the action of primary factors on the course of evolution.

14. 4,000 francs to Professor Andoyer, a first instalment towards the cost of the calculation of a new table of fifteen figure logarithms.

15. 4,000 francs to M. Bénard, to enable him to continue his researches in experimental hydrodynamics on a large scale.

16. 2,000 francs to Dr. Chauvenet, to enable him to continue his researches on zirconium and its complex combinations.

17. 2,000 francs to Professor François Franck, for the chronographic study of the development of the embryo, with special examination of the rhythmic function of the heart.

18. 2,000 francs to Professor Sauvageau, for the pursuit of his studies on the marine algæ.

SCIENTIFIC NOTES AND NEWS

The gold medal of the Royal Astronomical Society has been conferred on Professor A. Fowler for his work in astrophysics.

The Berlin Anthropological Society has awarded its Rudolf Virchow Medal to Dr. Karl Poldt, emeritus professor of anatomy in Vienna.

Professor Fritz Haber and Professor R. Willstätter, both of the Kaiser Wilhelm Institute for Chemistry, have been elected members of the Berlin Academy of Sciences.

Dr. Hans Meyer, known for his explorations in Africa, has been elected honorary professor of colonial geography in the University of Leipzig.

Dr. Pierre Weiss, professor of physics in the Zurich Technical School, has been awarded

the Lasferre prize ($1,600) by the French Institute.

DR. JOSEF ENGLISCH, emeritus professor of surgery in the University of Vienna, has celebrated his eightieth birthday.

DR. ALFRED KLEINER, professor of physics at Zurich, has on account of the state of his health retired from his chair and has been made honorary professor.

MR. T. F. BURTON has succeeded Mr. Watson Smith as editor of the Journal of the Society of Chemical Industry, which is issued fortnightly in London by the society.

PROFESSOR G. C. BOURNE, Linacre professor of comparative anatomy at Oxford, has been given leave of absence to engaged in military service.

WE learn from *Nature* that the second Indian Science Congress, organized by the Asiatic Society of Bengal, was held at the Presidency College, Madras, on January 14–16, under the presidency of Surgeon-general W. B. Bannerman. The sections of the congress, and their chairman, were as follows: Agriculture and applied science, Dr. H. H. Mann; physics, Mr. C. V. Raman; chemistry, Professor P. C. Ray; zoology, Dr. N. Annandale; botany, Dr. C. A. Barber; ethnology, Mr. H. V. Nanjundayya; geology, Dr. W. F. Smeeth.

PROFESSOR R. W. THATCHER, chief of the division of agricultural chemistry of the University of Minnesota, has been elected president of the Minnesota Section of the American Chemical Society. The section will hereafter hold regular meetings on the third Friday evening of each month at various laboratories in the Twin Cities.

DR. A. F. GILMAN, head of the chemistry department of Ripon College, has returned for the second semester's work after a leave of absence for a half year spent in study and travel.

PROFESSOR JOHN DEWEY delivered the eighth series of McNair lectures at the University of North Carolina on February 5, 6 and 7. His subject was "Philosophy and Politics." The lectures dealt with (1) The Inner and Outer Worlds, (2) The State and Moral Life, (3) The German Philosophy of History.

DR. C. WARDELL STILES, of the U. S. Public Health Service, gave the ninth Weir Mitchell lecture of the College of Physicians, Philadelphia, on February 16. His topic was: "An Experiment from the Standpoint of Applied Zoology in Medical Inspection of Schoolchildren as a Basis for an Intensive Public Health Campaign."

DR. LILIAN WELSH, professor of physiology and hygiene at Goucher College, Baltimore, spoke on February 12 at Mt. Holyoke College on "American Women in Science." The lecture was given under the auspices of the Nettie Maria Stevens memorial lectureship fund, established by the Naples Table Association, for promoting laboratory research for women. The lecture was also given during the week at Wellesley College and Brown University.

PROFESSOR DOUGLAS W. JOHNSON, of Columbia University, lectured before the Engineers Club of Trenton, N. J., on February 11, on "The Topography of Western Europe and its Influence on the Campaign against France." On January 15 he delivered the same lecture before the Geographical Society of Philadelphia.

PROFESSOR ARTHUR H. BLANCHARD, of Columbia University, on February 9, delivered an illustrated address on the subject "Economic Phases of Highway Engineering" before the Middletown Scientific Association at its meeting at Wesleyan University. On February 11 he delivered an address on "The Highway Engineer in Public Life" at the annual meeting of the Engineers Society of Northwestern Pennsylvania.

THE Illinois State Museum of Natural History announces a course of four popular illustrated lectures on natural history on Friday evenings as follows:

February 19—"Volcanic Emanations," by A. L. Day, Ph.D., director Geophysical Laboratory, Washington, D. C.

February 26—"The Wonderful Heavens," by F. R. Moulton, Ph.D., professor of astronomy, University of Chicago, Chicago.

March 5—"The Trophies of the Fossil Hunter," by A. R. Crook, Ph.D., curator Illinois State Museum, Springfield.

March 12—"Alaska Salmon," by H. B. Ward, Ph.D., professor of zoology, University of Illinois, Urbana.

The University of Oxford has received $2,200, as we learn from *Nature,* from friends of the late Professor Gotch, with the view of perpetuating the memory of the late Waynflete professor, and of encouraging the study of physiology within the university. The income of the fund will be applied, first, to the establishment of a Gotch memorial prize to be awarded annually, after examination, to a student in the physiological laboratory; and, secondly, to the creation and maintenance of a Gotch memorial library in the same laboratory. A portrait of Professor Gotch has been hung on the walls of the department.

Samuel Walker Shattuck, for forty-four years professor and comptroller of the University of Illinois, died at his home in Champaign on February 13. Professor Shattuck was born in 1841, at Groton, Mass. Since 1868 he has served the University of Illinois. For thirty-seven years he was head of the department of mathematics and from 1873 to 1912 he looked after the business affairs of the university. In 1912 Professor Shattuck was retired on the Carnegie Foundation.

Mr. F. W. Rudler, curator of the Museum of Practical Geology, London, died on January 23.

Dr. Karl Ludwig Moll, formerly professor of mechanical engineering in the Riga School of Technology, has died at the age of eighty-three years.

Dr. Nicolas Oumoff, professor of physics at Moscow, has died at the age of sixty-eight years.

There have been killed in the war, M. Robert Douvillé, paleontologist in the Paris School of Mines; Dr. Anton Lackner, docent for geometry in the Vienna Technological Institute; Dr. Rudolf Rau, formerly professor of physics at Jena, and Dr. Felix Hahn, geologist of the University of Munich.

The Berlin correspondent of the *Journal* of the American Medical Association writes that according to the latest official list, 132 medical men have so far been killed in the war, 22 wounded, 45 have died and 166 are missing or prisoners. Among the medical victims of the war are three distinguished scientific men, Professor Jochmann, the medical head of the infectious department of the municipal Rudolph Virchow Hospital, succumbed to typhus fever which he acquired in the examination and treatment of Russian prisoners of whom 800 are ill with typhus. Professor Sprengel, the superintendent of the surgical department of the Ducal Hospital in Brunswick, died from sepsis at the age of sixty-two, having infected himself at an operation on a wounded soldier. The Freiburg dermatologist, Professor Jakobi, died in the field as a result of disease.

The U. S. Civil Service Commission announces an examination for assistant in agricultural geography, for men only, to fill a vacancy in this position in the Office of Farm Management, Bureau of Plant Industry, Department of Agriculture, Washington, D. C., at a salary ranging from $1,800 to $2,000 a year. The duties of this position will be to assist in investigations being carried on in the above office concerning the development of agricultural enterprises under the influence of geographic conditions, such as topography, climate, soil, location, etc.

The Robert D. Brigham Hospital for Incurables benefits to the extent of $50,000 by the will of Mrs. Ellen A. R. Goldthwait, of Boston. This sum is to constitute a fund to be known as the Joel and Ellen Goldthwait Research Fund, and the income is to be used for work to increase the knowledge of chronic diseases.

It is stated in *Nature* that a meeting of the General Organizing Committee for the International Botanical Congress, which has been arranged to be held in London next May, took place at the Linnean Society's rooms on January 21. A report was given of the work of preparation which had already been carried out by the executive committee, and the mem-

bers were asked to consider the present position. The two following resolutions were carried: (1) That the congress be not held in 1915; (2) that the present executive committee continue to act so long as necessary. The committee was strongly of opinion that a meeting of the congress in London should not be abandoned, and the suggestion was made that it might take place at the next quinquennium, in 1920. But it was agreed that nothing definite could be settled at the present time, and the following resolution was passed: "That the executive committee be authorized to convoke a meeting of the general committee at some future date to consider the date of the congress." It was also decided that in the meantime the general committee be called together once a year.

THE year 1914 was an eventful one in the industry of mining radium, uranium and vanadium ores and had by far the largest year's production yet made. Figures collected by Frank L. Hess, of the United States Geological Survey, indicate that the output amounted to about 4,300 short tons of dry ore carrying 87 tons of uranium oxide and 22.4 grams of metallic radium. The ore was valued at about $445,000. The ore produced in 1913 contained 41 tons of uranium oxide and 10.5 grams of radium, and that produced in 1912 contained 26 tons of uranium oxide and 6.7 grams of radium. About nine tenths of the contained radium is thought to be recoverable under improved processes. Although carnotite, a mineral of these rare metals, contains three times as much uranium oxide as vanadium oxide, the Colorado and Utah ores of these metals generally contain other vanadium minerals in such quantity that vanadium oxide is present in excess of the uranium oxide. However, little is paid for the vanadium, as its separation from uranium is troublesome, and only a few thousand dollars was received in 1914 by brokers or producers for the vanadium in the ores sold. Sandstone impregnated with roscoelite, a vanadium-bearing mica, is mined at Vanadium, San Miguel County, Colo., on the eastern edge of the carnotite field, by the Primos Chemical Co. The total quantity of vanadium in the carnotite and other ores mined during the year was apparently about 432 tons. About the beginning of 1914, owing to the very high prices charged for radium salts, their scarcity, their evident usefulness in treating diseases, the practical impossibility of the poor receiving treatment by radium because of its scarcity and high cost, and to the fact that much of the radium-bearing ore was being shipped out of the country, Secretary of the Interior Lane caused to be introduced in Congress bills reserving radium-bearing lands from entry as mining claims, and providing for government purchase. The bills are still pending. During the year the National Radium Institute conducted, under the supervision of the Bureau of Mines, mining operations at Long Park, near Paradox Valley, in Montrose County, Colo., and a plant at Denver for the production of radium and investigation of processes. The work has been so encouraging that Director Holmes has announced the probable production of radium at one third its present cost. Messrs. Lind and Whittemore, of the Bureau of Mines, state that their investigations show that carnotite carries proportionally to its content of uranium as much radium as pitchblende or other uranium minerals—that is, the radium has reached its maximum ratio to the uranium from which it is derived and is thus in equilibrium. From published results of experiments made on casual specimens of carnotite it had been popularly supposed that carnotite was less rich than pitchblende in radium.

AN unusual feature of the work of the United States Coast and Geodetic Survey, Department of Commerce, during the past summer was the successful use of a one and one half ton automobile truck in transporting an astronomical party and outfit through a portion of the southwest which is generally dreaded by the transcontinental tourist. The party was in charge of Mr. C. V. Hodgson and was in the field from May to October. The trip is the more remarkable when the fact is taken into consideration that the requirements of the work prevented a close adherence to the routes usually followed. Observations were

frequently made on mountain peaks, so the journey was from mountain to mountain, rather than along main traveled roads from city to city. The general route followed by Mr. Hodgson and his party was from Denver, Colorado, to Pecos, Texas, then southwest almost to El Paso, where a detour was made over poor trails through southern New Mexico into Arizona. The central and southern portions of the latter state were rather well covered, the itinerary including Solomonsville, Douglas, Benson, Tucson, Globe, Phoenix, Yuma and Parker. The auto truck was then driven across California to San Diego and the San Jacinto mountains, thence via Los Angeles, Mojave and Sacramento to Carson City, Nevada. Astronomical observations were carried along the California-Nevada boundary to Needles, California, where the season ended. During the season the truck, carrying a capacity load, was run more than 5,000 miles under road conditions varying from the deep mud encountered in New Mexico and Texas, and the heavy sands of the Colorado River and Nevada desert regions, to the splendid roads of southern and central California. The cost sheets of the season show that the work was done at a saving of at least 35 per cent. from the cost had teams been used. The cost per mile for oil and gas varied from 2.7 cents to 6.6 cents in different sections of the country, and averaged 3.9 cents for the entire season. A remarkable feature of the performance of the truck and a tribute to the good work of the driver was the fact that, from the time of leaving Colorado Springs to the end of the season, about six months, during which the truck was run over 5,000 miles, only two hours were lost on the road on account of engine troubles.

We learn from the *Geographical Journal* that Messrs. Geo. Philip and Son, Ltd., have prepared a relief model map of Central Europe, constructed to illustrate the topography of the main theaters of the present war. The model, which costs £6, 6s., measures 62 by 35 inches, and is on a horizontal scale of 18 miles to the inch, and a vertical one of 5,000 feet to the inch, so that the heights are exaggerated nineteen times. Political boundaries are shown, and also towns in red, but neither roads nor railways. The model is said to show well the continuity of the Central Plain from Russia westwards to the margin of the North Sea and the Channel, and thus makes clear at once the exposed frontier of Germany, and the military reason for the violation of Belgian neutrality. Most of the places which have become famous in the western war area are marked, and it is possible to follow very clearly the battle lines of the Marne and of the Aisne, the fighting in the Argonne region, the conflicts round Ypres and the Yser, and so on. Among minor features which are well shown, are the position of the gap of Toul, due to the fact that a stream which once ran into the Meuse has been captured by the Moselle, and the deserted valley forms an open groove between the two rivers, a groove through which passes the railway from Paris to Toul and Nancy. The position of Reims, also, placed as it is on a natural line of communication between Champagne, Burgundy, the middle Rhine valley and the Low Countries, is clearly seen, and it helps to explain the constant bombardment of that ill-fated city, whose splendid cathedral illustrates its early importance as a crossing-point of routes.

We learn from the *Journal* of the American Medical Association that the secretary of state of Missouri has issued articles of incorporation to "The Missouri Foundation for Health Conservation," the purposes of which are "the conservation of health and the prevention of disease to the end that human efficiency may be increased and human suffering prevented." Its purposes are to be secured by any means "that demands of time or of science may require." The first activity undertaken will be a medical laboratory to be established at St. Joseph, with its tributary population of $1,000,000. It is intended that this institution shall be a clearing-house where all doctors living in the country tributary to St. Joseph may send specimens from patients for analysis and get prompt returns. The work will be financed by fees, donations, subscriptions and bequests, its aims being

scientific, social and benevolent and not commercial. In addition to the medical laboratory, other activities for health conservation will be inaugurated. The secretary of the foundation is Dr. Daniel Morton, St. Joseph, and the members of the board of control are prominent citizens of St. Joseph and the state.

FROM the annual statement of the British board of trade *Nature* prints figures for 1913 of imports of scientific instruments and apparatus, as follows:

Scientific Instruments and Apparatus (other than Electrical) Complete

	£
Total imports	710,341
Of which from Germany	362,891
Belgium	28,939
France	108,040
Switzerland	19,872
U. S. A.	182,293

Parts thereof (including Kinematograph Films, Photographic Plates and Films, and Sensitized Photographic Paper)

	£
Total imports	2,373,426
Of which from Germany	310,229
Belgium	126,725
France	522,682
Switzerland	28,762
Italy	121,842
U. S. A.	1,256,311

It thus appears that the imports from the United States exceed those from France and Germany combined. It may be expected that hereafter the imports of scientific apparatus (of which, however, photographic supplies are a considerable part) from the United States will exceed those from all other countries combined.

UNIVERSITY AND EDUCATIONAL NEWS

THE Thomas W. Evans Museum and Dental Institute, School of Dentistry, the University of Pennsylvania, will be dedicated on February 22 and 23. On the afternoon of February 22 the presentation and formal opening of the building will take place and addresses will be made as follows:

Dr. Charles Gordon, of Paris, France.

Dr. Wilhelm Dieck, of Berlin, Germany.

Mr. John Howard Mummey, M.R.C.S., L.D.S., of London, England.

Dr. William Simon, of the Baltimore College of Dental Surgery

Dr. Edward C. Kirk, dean of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

THE new building of the Mellon Institute of Industrial Research of the University of Pittsburgh, will be dedicated on the morning of February 26. The principal address will be made by Dr. Rossiter W. Raymond. In the evening Professor John J. Abel, of Johns Hopkins University, will deliver the first Mellon Lecture under the auspices of the Society for Biological Research of the University of Pittsburgh. The subject of the lecture will be "Experimental and Chemical Studies of the Blood and Their Bearing on Medicine."

DR. KARL T. COMPTON, instructor in physics at Reed College, Portland, Oregon, will go to Princeton University next fall as assistant professor of physics. Dr. Compton received the degree of Ph.D. at Princeton in 1912.

Two new members have been recently added to the faculty of the New York State College of Forestry. Mr. G. A. Gutches, formerly in the U. S. National Forest Service, later district forest inspector of Saskatchewan, Canada, becomes director of the New York State Ranger School at Wanakena, N. Y. Mr. H. H. Tryon, formerly forest engineer, becomes instructor in forest utilization. This makes eight new appointments to the faculty of the New York State College of Forestry within the past year. The appointment of Dr. C. C. Adams as assistant professor of forest zoology was noted in SCIENCE of June, 1914. The other recent appointments are as follows: Dr. J. Fred Baker, formerly professor of forestry in Michigan Agricultural College, as professor of experimental forestry; Dr. L. H. Pennington, formerly associate professor of botany in Syracuse University, as professor of forest pathology; Dr. H. P. Brown, formerly instructor at Cornell, as assistant professor in forest botany; Mr. Shirley W. Allen, formerly deputy forest supervisor of the Lassen National Forest, California, as assistant professor of

forest extension, and Mr. L. D. Cox, formerly landscape architect to the Park Commission of Los Angeles, as assistant professor of landscape engineering.

Sir Henry Miers, formerly professor of mineralogy at Oxford, has resigned the principalship of the University of London to become vice-chancellor of Manchester University.

Mr. L. G. Owen has been appointed professor of mathematics at the Government College, Rangoon.

Dr. Rudolf Höber has been made professor of physiology at Kiel, in succession to Professor A. Bethe, who has accepted a call to Frankfurt.

DISCUSSION AND CORRESPONDENCE

A TYPICAL CASE

Professor ——— graduated at ——— University and, taking a post-graduate course, received the degree of Ph.D. He then went abroad, studied at the ——— University, and returned to America, full of enthusiasm for original research. He had published an important memoir for a thesis, which was well received, his instructors encouraged him and his fellow students appreciated and were interested in his work.

He now received an offer of a professorship in a small country college, married, and began his new life expecting to continue his investigations. He soon found that his entire time was occupied in teaching, and that he was obliged to eke out his small salary by writing and lecturing. He could not bear to abandon his great object, the advancement of human knowledge, and found that he could, by extra efforts, devote a portion of his evenings to research, amounting to a fourth of his entire working capacity. He went to the president of the college, asking for an appropriation for an assistant, who could do the routine work of copying, computing, etc., as well and as rapidly as he could himself. Instead of a quarter of his time, he would thus have one and a quarter, or five times as much, and could make rapid progress at small expense. The president told him that the object of the institution was teaching, not research, and that it was impossible to grant his request. A fellowship was, however, vacant, and might answer his purpose. This, however, would be of no use to him, as the fellow would not want to do routine work, but to undertake a research of his own, and would expect to be taught how to do it. His associates were teachers, not investigators, and took no interest in his plans. After repeated trials and discouragements, he abandoned his efforts and settled down as a teacher only, with no ambitions beyond enabling his classes to pass their examinations.

While good teachers are as much needed as investigators, the work of the latter may be greatly impeded if their main energy is devoted to instruction. The finding of such men, and enabling them to carry on the great work, for which they are fitted, by providing them with apparatus, assistants, or means for publication, is one of the principal objects of the Committee of One Hundred on Scientific Research.

Edward C. Pickering

January 27, 1915

A SPHENOIDAL SINUS IN THE DINOSAURS

The work which has been done recently on the accessory nasal sinuses in man and the mammals by H. W. Loeb, J. P. Schaeffer, Onodi, Ernst Witt, Ritter, A. W. Meyer, as well as the earlier work of Zuckerkandl, may receive some interesting additions from paleontology. While in no sense intending to affirm any genetic relations between the dinosaurs and mammals it is yet an interesting fact that a large sinus occurs in the sphenoidal region of dinosaurs and labyrinthodonts. It has previously been largely confused with the pituitary fossa near which it lies but recent work tends to show a distinction between this fossa for the lodgment of the hypophysis and the *recessus basisphenoidalis* as it is called by Osborn[1] who has figured this cavity very clearly in *Tyrannosaurus rex,* the huge carnivorous dinosaur from the Cretaceous. The

[1] Osborn, H. F., 1912, *Mem. Amer. Mus. Nat. Hist.*, N. S., Vol. 1, Pt. 1, Pls. III. and IV.

cavity in this dinosaur is quite extensive and corresponds in position to the human sphenoidal sinus and resembles this structure in some of its complications such as are occasionally found in man. The structure seems to occupy portions of both the basisphenoid and the basioccipital and to extend a considerable distance toward the occipital condyle. There are five, possibly six, saccular divisions of the sphenoidal sinus (recessus basisphenoidalis). These divisions recall the saccular divisions of the sphenoidal and frontal sinuses of man and from their smooth walls one would expect to find a membranous lining as in man. So far as I am aware this cavity has no connection with the nasal cavity, although such a connection may be demonstrated from additional or from a restudy of present material. The recess lies below and between the points of exit of the third and twelfth cranial nerves, the mass of the brain being immediately above it. Several authors have observed a similar depression in the sphenoidal region of the Labyrinthodont skull and in other primitive vertebrates, notably the early reptiles. It is a well known fact that the hypophysis and particularly the posterior portion of this structure is, in the early land vertebrates, quite large and it has been the natural assumption that the large recess near where the hypophysis occurs should lodge the glandular organ, but it is entirely probable that the recess is the sphenoidal sinus. There is no necessity of adopting Osborn's term *recessus basisphenoidalis* since there is no doubt that the structure corresponds well with the *sinus sphenoidalis* of man. It is to be hoped that someone will take up the question of the general homologies of these cavities in different groups of vertebrates so that we may have a firm basis on which to work. The value of fossil animals in furnishing facts of anatomical importance has never been fully realized and it is to be hoped that an attempt will be made to fill this gap.

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SCIENTIFIC BOOKS

Human Physiology. By PROFESSOR LUIGI LUCIANI. In four volumes; Volume II. Translated from the Italian by FRANCES A. WELBY. London, 1913.

The realm of physiology has become so extensive that the preparation of an encyclopedic treatise on the subject by a single author is a notable intellectual feat. The admirable manner in which Luciani has accomplished this feat in his *Fisiologia dell' Uomo,* is testified to by translations which have been made into both Spanish and German. Not only does the book include a review of recent and generally accepted observations and interpretations, but also in many subjects an account of the historical development of our knowledge from ancient to modern times. The reader is thus given a perspective which is rarely obtained except by particular historical research.

A very considerable part of the value of Luciani's great handbook arises from his generous citation of original sources, both old and recent. This feature gives the exposition a permanent utility for the careful student who desires to become acquainted with reports by the discoverers themselves. Such a student should not depend wholly on English and German references to literature; he would do well to examine also French and Italian summaries, for, it must be admitted, there are not infrequently possibilities of tracing work thus which has not been represented where we have been most accustomed to look. Luciani's bibliographies present a rich mine of references to Italian as well as to other original papers.

The present volume (number II. of the four volumes of an English translation) is a good example of the whole. It is concerned with the internal secretions, the digestive secretions, the processes of digestion both mechanical and chemical, absorption and excretion. Many of the illustrations are taken from the original investigations, and a number of them are colored. The chief criticism that can be made against the work is that during the time required for its writing and being translated physiology has been going

forward so rapidly that important researches of the past four or five years are not found included in it. This defect, however, as intimated above, may be regarded as compensated for by the comprehensive and historical sweep which characterizes Luciani's survey of the subject.

W. B. Cannon

The Wonder of Life. By J. Arthur Thomson. New York, Henry Holt and Company. 1914.

Once more we are indebted to Professor Thomson for a semipopular work on biology, this time with contents of a very miscellaneous character, better to reflect the varied aspects of living nature. We have, in fact, a biological (mainly zoological) scrap-book, full of interesting matters gleaned from more or less recent literature, carefully selected and digested for our benefit. All this is loosely thrown together under several general headings, "The Drama of Life," "The Haunts of Life," "The Insurgence of Life," "The Ways of Life," "The Web of Life," "The Cycle of Life" and "The Wonder of Life," with more than 300 separate minor topics. Each chapter is headed by a selection from the aphorisms of Goethe, as translated by Huxley. The book is admirably adapted for "supplementary reading" in a course on biology or zoology, or it might itself be made the basis of a seminar course. Its great value lies in its wide scope and breadth of view, with every emphasis on vital phenomena rather than on morphological details or classification. It is addressed, however, to an educated public, and even in places presupposes more zoological knowledge than most of us can boast. For example, on page 105 we are pulled up short by the startling announcement that "no one expects to find a Crustacean like *Byotrephes longimanus* in a pond." It is probably true that very few have ever approached a pond with any such expectation! Doubtless it is good for us, however, to bump now and again into things we do not understand, merely to diminish that conceit which too readily develops after reading discussions so lucid as those of Professor Thomson.

The specialist will here and there find things not quite up to date, or stated without sufficient reference to diverse points of view, but the general impression gained is that the work is admirably done, and that in all probability no other naturalist could have done it better, if so well. The illustrations, including many colored plates, are pleasing and instructive, but not up to the standard of the text. Some are really bad, as Fig. 81, a colored plate of leaf-insects (*Phyllium*). The coloring of the foliage, to correspond with the insects, is unnatural and without any adequate basis; while the insects are drawn from mounted specimens with the legs spread in the conventional way, without any reference to the plant on which they are supposed to be resting! The most ridiculous object is the young one, shown as resting on a nearly upright branch, with its legs waving wildly in the air. The whole thing is certainly, as it stands, a piece of "nature-faking." Fig. 39, representing young spiders, shows some of them with the head and thorax separate, like an insect.

There is a passage on page 595, beginning the discussion of the Transmissibility of Acquired Characters, which indicates that such transmission is perfectly easy in unicellular animals, which simply divide into two. Jennings has well shown the fallacy of this naïve conception, and it seems surprising that Professor Thomson should offer it, not merely as an idea, but as a well-known fact.

T. D. A. Cockerell
University of Colorado

SPECIAL ARTICLES

Microdissection Studies on the Germ Cell[1]

This paper records a continuation of the observations published recently[2] in Science on the male germ cells of the grasshopper, *Disosteira Carolina,* and of the cockroach, *Periplaneta Americana.* The cells were iso-

[1] Slightly modified from a paper read before the American Society of Zoologists, Philadelphia, December 29, 1914.

[2] Robert Chambers, Jr., "Some Physical Properties of the Cell Nucleus," Science, N. S., XL., p. 824, 1914.

lated and studied by means of microdissection and vital staining in a hanging drop of the insect body fluid in Barber's moist chamber.

The cytoplasm exhibits an extreme variability in its consistency. On tearing it may go into solution, setting free the nucleus and the cytoplasmic granules. Often the cytoplasm goes into solution with a rapidity suggestive of an explosion. A slight tearing of the surface is followed by a moment of apparent inactivity. Then comes a slight convulsive movement and the torn surface opens up, a swelling appearing especially at this place. Within a few seconds nothing remains but the nucleus and the mitochondria in the form of granules or a network. The nucleus in its turn swells and goes into solution. The mitochondria persist for a much longer time. Individuals are also met with whose cells retain their shape, the torn region being gradually obliterated by a closing in of the surrounding cytoplasm.

It is significant that all the cells of a given individual are constantly uniform in their behavior.

In an attempt to ascertain the cause for this variability in the consistency of the protoplasm a series of experiments has been planned, one of which is the investigation of the germ cells of food and water starved individuals. Cockroaches starved for three weeks in a dry heated room were found uniformly to possess germ cells remarkable for their toughness and resistance to mechanical injury.

"Physiological" salt solutions in various dilutions were all found to produce a swelling effect on the cell. The first evidence of this in isolated cells is the assumption of a spherical shape. The addition of a trace of egg albumin counteracts the swelling to a slight extent. As swelling proceeds the viscosity of the protoplasm at first increases, agglutination phenomena becoming very marked. Later the viscosity is lost, possibly due to the increased imbibition of water.

When observed in body fluid, the cells tend to keep their irregular shapes. Spermatocytes exhibit slow amœboid movements. Isolated cells, however, soon become spherical. They also become spherical and swell on injury as when they are punctured with a needle.

The mitochondria in the primary spermatocyte of *Disosteira* form a voluminous granular network surrounding the nucleus, plainly visible in the fresh unstained cell. The delicate tracery of the mitochondrial structures in this, and in subsequent, stages is shown beautifully with Janus green, beside which similar structures seen in fixed material appear crude and in many respects erroneous. If the Janus green stain be heavy, its coagulative effect is apparent in the increase and clumping together of the granules. If the cell be torn, the cytoplasm goes into solution and the stain very soon fades out, the granules swell and coalesce, forming irregular lumpy masses which persist for a long time.

During metaphase the mitochondrial network is pulled out into a spindle-shaped structure investing the viscous kinoplasmic material. Tearing of the cytoplasm causes a loss in the bipolar arrangement of the cell structures, the mitochondrial strands wrinkle and the whole spindle becomes distorted. The chromosomes scatter. Within a few minutes the relatively dense kinoplasmic mass goes into solution leaving the mitochondrial network with the chromosomes irregularly dispersed inside. In one such case two spermatozoa corkscrewed their way between the meshes of the mitochondrial spindle. Whenever their tails touched the viscous material of the meshes violent lashings were necessary to set themselves free. One struck its head against a mesh and was held prisoner for several minutes until the viscosity of the material was decreased during the dissolution process. The other spermatozoon hit a chromosome which stuck to its tail and the spermatozoon twirled away dragging off the chromosome.

During anaphase and telophase the granules and strands of the mitochondrial network are lengthened into delicate filamentous threads lying between the two groups of chromosomes. These are the interzonal filaments or the spindle-rest described in fixed material. As constriction between the daughter cells progresses, the tension of the fila-

ments diminishes. Their tips vacuolize and appear lumpy, giving evidence again of a network arrangement of granules. As the constriction deepens, the cluster assumes the form of an hour-glass. The Janus green stain now disappears at the middle as if the mitochondrial material were drawn away or had gone into solution. In late telophase the substance of one daughter cell may be torn away from the other cell leaving the mitochondrial filaments projecting in naked strands which soon wrinkle and curl and finally coalesce into a lumpy mass.

Cells in late anaphase and telophase may be caused to assume a spherical shape by mechanical agitation or tearing with the needle. The mitochondrial spindle is then very much distorted, the filaments become wrinkled and tangled. At the end of the cell division, each daughter cell contains a cluster of mitochondrial filaments which have already begun to be transformed into a granular network mass which gradually spreads around the nucleus. The mitochondria are not stable structures. Granules at one moment may draw out into threads, or coalesce with their neighbors, or go into solution, freshly formed granules replacing them.

In the spermatid the mitochondria mass at one side of the nucleus to form the Nebenkern. The mitochondrial granules, at first loosely distributed, soon collect into a compact body which stains a solid blue with Janus green. On dissecting the Nebenkern out of the cell, it disintegrates into granules which persist as such for some time.

The development of the axial filament was closely followed in the cockroach. It originates in connection with an apparent sloughing off of material from the surface of the Nebenkern. The coiled filament thus formed is bordered on two sides with a longitudinal row of granules collected at very regular intervals in small uniform clumps. The filament itself does not stain with Janus green, the bordering granules, however, become intensely blue. One may watch the filament gradually uncoil and loosen from the Nebenkern. One end is inserted in a conical knob, (the blepharoblast), on the surface of the cell nucleus. As it uncoils, it forms a loop curving along the periphery of the cell. The uncoiling is accompanied by an oscillatory movement which begins at the knob and passes in a wave along the filament. This movement gains in strength until the whole body of the cell is thrown into ever recurring waves. The movement is instantly arrested when the cytoplasm is torn by the needle. The cytoplasm then goes into solution and the filament either straightens out or deepens its curve possibly according to the character of the wave at the moment the spermatid is torn. The filament remains attached to the nucleus and may be dragged about with a needle. It is elastic and rigid and keeps its shape perfectly for the short time before it goes into solution. During the process of its elongation the spermatid is very susceptible to touch. A slight prick with the needle will cause it to assume a spherical shape. This is accompanied by a distortion of the double row of granules alongside the axial filament so that one may observe the wave pass along one row slightly ahead of that along the other.

When examined in Ringer's fluid or when the spermatid is disturbed by the needle, the clumps tend to round off in the form of vesicles. This is especially noticeable in the case of the two largest clumps close to the nucleus. Such an appearance is commonly met with in fixed material. As the filament straightens, the cell is drawn out into an attenuated body. The granules along the filament coalesce to form two narrow uniformly homogeneous bands which extend alongside the spherical nucleus to the anterior tip of the spermatid. The nucleus condenses into an optically homogeneous and highly refractive body which gradually lengthens into the rod shape of the mature spermatozoon. A large double clump of granules which lies immediately behind the nucleus condenses and forms the neck piece. The throwing off of clumps of cytoplasm was never observed except in preparations in salt solutions or in old body-fluid preparations where such cytolytic action was apparent in all the cells present.

The perforatorium of the ripe spermatozoon tapers off in the form of a corkscrew. In Ringer's fluid it swells into a bleb-like process and as such is figured by Duesberg and Morse. The tail has two movements, a whip-like lash and a twirl, its base being used as a pivot. These two movements whirl the spermatozoon forward in a corkscrew fashion. It may be noted that the lashing movement of the spermatozoon tail is directly comparable to the waving of the axial filament within the spermatid.

In conclusion I wish to emphasize the following points drawn from this and from my previous paper:

1. As far as nuclear structures are concerned the study of fresh material corroborates, in many interesting details, the observations made in fixed material. Both methods are necessary for a proper understanding of the structures. Our present fixing methods, however, are useless for the study of cytoplasmic and mitochondrial structures and should be replaced by the study of fresh material.

2. "Physiological" salt solutions are more or less injurious to the cells studied which are normally bathed by organic fluids, *i. e.*, liquid colloids.

3. Puncture of a cell by a needle causes irreparable injury. When the injury is slight it at first hastens the normal reversible changes in the physical states of the colloids in the cell but soon transforms them to an abnormal condition from which the cell does not recover.

4. Injury to the cell is always followed by swelling accompanied by an increased inhibition of water.

5. A tension exists in the cell during division which is immediately lost when any part of the cell is torn.

6. Amœboid activities are prevalent among the germ cells. In this way extensive movements occur within the cysts of the testis follicle. When set free in a liquid medium, the amœboid processes are very soon retracted and the cells assume a spherical shape.

The movement in waves of the axial filament of the spermatid starts at the conical knob on the nucleus and accompanies the uncoiling of the filament from the surface of the Nebenkern.

7. The staining of the mitochondria by Janus is probably not due to a chemical combination. In time the stain fades out of the cell. If the stained structure be brought into immediate contact with a liquid it is washed out almost immediately.

8. Janus green, if used in sufficient concentration, will stain the nuclear structures. The dye is reduced to the red safranin even in the presence of abundant air. This has been observed in all stages of the germ cells and also in motile spermatozoa. Such cells, however, soon die. Dead cells take up the blue stain readily, the nuclear structures showing beautifully.

9. Janus green, being a basic dye, coagulates albuminous substances. In living cells this coagulating effect is very noticeable. The stain, therefore, can not be used as the sole means for identifying mitochondria.

10. The mitochondria, in the Orthopteran germ cell, are in accord with those studied by the Lewises[3] in the tissue cells of the chick. They can not be classed as persistent structures. They pass from a granular stage into strands; they may coalesce into homogeneous masses; they disappear and reappear and must be merely changes in physical states of the colloids which compose the cytoplasm.

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SOME NEW CASES OF APOGAMY IN FERNS. PRELIMINARY NOTE

SEVERAL cultures of *Aspidium tsussimense*, *Pellæa adiantoidis* and *Lastrea chrysoloba* were made beginning June 25, 1914. The spores were sown on sphagnum, which was first placed in small stender dishes, saturated with a one-tenth-per-cent. Knop's solution, and then thoroughly sterilized in an oven.

[3] M. R. and W. H. Lewis, "Mitochondria in Tissue Culture," SCIENCE, N. S., XXXIX., p. 330, 1914.

So far as I have been able to observe, nothing unusual occurs in the early stages of development of the prothallia of any of the three species. The prothallia of *Aspidium tsussimense* and of *Lastrea chrysoloba* grow to a large size and are typically heart-shaped. The prothallia of *Pellæa adiantoidis* are much smaller and in some respects resemble those of *Pellæa atropurpurea,* in which species I described apogamy in 1910.[1] Antheridia are produced in large numbers on many of the prothallia of each of the three species here under consideration. The antherozoids are actively motile and appear to be normal in every respect. Archegonia have been observed on some of the prothallia of *Lastrea chrysoloba.*

On the well-developed cushion of the prothallium of *Aspidium tsussimense,* usually at some distance back of the apical notch, a number of papillate projections appear. These projections frequently occur in groups. Sometimes each consists of a single cell, but more frequently of a single row of cells. In this portion of the prothallium, usually after the projections have been formed, a compact mass of cells appears which develops into an embryo. At an early stage in the formation of this apogamous embryo, tracheids are produced. The developing embryo never produces a foot. The primary leaf as a rule is formed in advance of the primary root. The stem appears later than the leaf and the root. Even while the embryo is very young, numerous scales appear on the petiole of its primary leaf. These resemble the scales so characteristic of the mature sporophyte.

The prothallia of *Pellæa adiantoidis* also produce embryos apogamously. The development of the embryos appears to be similar to that described in my previous paper for that of *Pellæa atropurpurea.* In a number of cases in my cultures the embryo has already formed the primary leaf and the primary root.

When the embryo of *Lastrea chrysoloba* is about to form, a small light region appears between the apical notch and the cushion. In this region the embryo is developed. In all of my cultures the apogamously produced embryo has just begun to project above the surface of the prothallium. Embryos developed from a fertilized egg have not been found. When prothallia-bearing archegonia are placed in a drop of water on a slide and examined microscopically, the archegonia can be observed to open, but antherozoids do not appear to be attracted to them.

While the prothallia of these species of ferns were being grown, numerous cultures of other species maintained under the same conditions of nutrition, light, temperature and moisture, contained prothallia bearing antheridia and archegonia, and in some cases embryos were produced upon these prothallia as a result of fertilization.

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[1] *Bot. Gaz.,* 42, 400–401, 1910.

THE AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS

The sixth annual meeting of the Pharmacological Society was held in St. Louis at Washington University Medical School on December 27–30, 1914. There were five scientific sessions, three of them being joint meetings with the other members of the Federation of American Societies for Experimental Biology, the Physiological Society, the Biochemical Society and the Society for Experimental Pathology.

The following officers were elected in the Pharmacological Society for the year 1915:

President: Torald Sollmann.

Secretary: John Auer.

Treasurer: Wm. deB. MacNider.

Additional members of the council: Worth Hale and D. E. Jackson.

Membership Committee: S. J. Meltzer (term expires 1917).

Election of New Members: The following candidates were approved by the membership committee, passed by the council and elected by the society: Dr. F. C. Becht, University of Chicago; Dr. W. H. Brown, Rockefeller Institute; Dr. F. L. Gates, Rockefeller Institute.

The attendance was excellent, but the eastern section of the country was not as well represented as could be desired.

The scientific sessions were opened on Monday, December 28, at 9 A.M. by a joint meeting of the

four societies, Dr. Graham Lusk presiding. The following papers were read and discussed:

"Experimental Hyperthyroidism," by W. B. Cannon, C. A. Binger (by invitation) and R. Fitz (by invitation).

"Further Observations on the Etiology of Goiter in Fish" (read by title), by David Marine.

"Studies on Experimental Cretinism," by H. R. Basinger (by invitation) and A. L. Tatum.

"A Research into the Function of the Thyroid" (read by title), by G. W. Crile, F. W. Hitchings (by invitation) and J. B. Austin (by invitation).

"The Effect of Repeated Injections of Pituitrin on Milk Secretion" (read by title), by S. Simpson and R. L. Hill (by invitation).

"The Action of Pituitrin on the Mammary Gland," by W. L. Gaines (by invitation).

"On the Mechanism of Pituitrous Diuresis" (read by title), F. P. Knowlton and A. C. Silverman (by invitation).

"The Several Factors Involved in the Standardization of Pituitary Extracts," by George B. Roth.

The first scientific meeting of the Pharmacological Society took place in the afternoon at 2 P.M., Dr. Sollmann presiding. The following papers were read and discussed:

"The Fatal Dose of Various Substances on Intravenous Injection in the Guinea-pig," by S. Amberg and H. F. Helmholz.

"Experimental and Clinical Research into Alkalescence, Acidity and Anesthesia" (read by title), by G. W. Crile.

"Effects of Chelidonin on Surviving Organs," by P. J. Hanzlik.

"The Effect of Temperature on the Response of Frogs to Ouabain," by T. Sollmann, W. L. Mendenhall (by invitation) and J. L. Stingle (by invitation).

"Artificial Cerebral Circulation after Circulatory Isolation of the Mammalian Brain," by E. D. Brown.

"The Uterine Action of Quinidin, Cinchonin and Cinchonidin," by Worth Hale.

"Some Vasomotor Reactions in the Liver," by C. D. Edmunds.

"Distribution of Solutions in Cardiectomized Frogs with Destroyed or Inactive Lymph Hearts," by T. S. Githens and S. J. Meltzer.

"The Influence of Intra-intestinal Administration of Magnesium Sulphate upon the Production of Hyaline Casts in Dogs," by F. L. Gates (by invitation) and S. J. Meltzer.

The second scientific meeting was held on Tuesday morning at 9 o'clock, Dr. Sollmann in the chair. The following papers were presented and discussed:

"A Study of the Relative Importance of the Vascular Mechanism of the Kidney and of the Epithelial Element of the Kidney in Determining the Efficiency of Various Diuretics" (read by title), by W. deB. MacNider.

"Cross-tolerance of Drugs," by H. B. Myers (by invitation).

"Vascular Reactions in Poisoning from Diphtheria Toxin," by H. B. Myers (by invitation) and G. B. Wallace.

"The Action of Digitalis in Experimental Auricular Fibrillation," by A. D. Hirschfelder.

"The Effects of Drugs upon the Circulation in the Pia Mater and the Retinal Vessels," by A. D. Hirschfelder.

"The Action of Camphor on the Circulation," by Clyde Brooks and J. D. Heard (by invitation).

"The Effect of CO_2 upon the Convulsant Action of Acid Fuchsin in Frogs," by Don R. Joseph.

"The Mechanism of the Toxic Action of the Heavy Metals on the Isolated Heart," by Carl Voegtlin.

"An Analysis of the Action of Digitalin on the Cardiac Inhibitory Center and on the Cardiac Muscles," by C. W. Greene, L. R. Boutwell (by invitation) and J. O. Peeler (by invitation).

"A Comparative Study of the Influence of the Solvent upon the Toxicity of Thymol," by W. H. Schultz.

"The Reaction of Hookworm Larvæ to Certain Chemicals," by W. H. Schultz.

"A Further Observation on the T-wave when Digitalis is Given," by A. E. Cohn.

The next meeting in the afternoon was a joint scientific session of the societies forming the Federation and the following papers were read and discussed, Dr. Sollmann presiding:

"The Influence of Sodium Carbonate on the Glycosuria, Hyperglycæmia and the Respiratory Metabolism of Depancreatized Dogs" (read by title), by J. R. Murlin and B. Kramer (by invitation).

"The Influence of Depancreatization upon the State of Glycæmia after Intravenous Injections of Dextrose in Dogs," by I. S. Kleiner and S. J. Meltzer.

"The Possibility that some of the Hepatic Glycogen May Become Converted into Other Substances than Dextrose," by J. J. R. Macleod.

"Narcotics in Phlorhizin Diabetes," by R. T. Woodyatt.

"Adrenal Deficiency," by R. S. Hoskins.

"Hypoglycemia," by H. McGuigan.

"Some Effects of Adrenalin when Injected into the Respiratory Tract," by J. Auer and F. L. Gates (by invitation).

"The Relation of the Adrenals to the Brain" (read by title), by G. W. Crile, F. W. Hitchings (by invitation) and J. B. Austin (by invitation).

"Further Observations of the Origin of Hydrochloric Acid in the Stomach" (read by title), by A. B. Macallum and J. B. Collip (by invitation).

"The Effect of Various Fluids and Cereals on Gastric Secretion" (read by title), by C. C. Fowler (by invitation), M. E. Rehfus (by invitation) and P. B. Hawk.

"The Distribution of Gastrin in the Body," by R. W. Keeton (by invitation) and F. C. Koch.

"The Relation of the Digestion Contractions to the Hunger Contractions of the Stomach (Dog, Man)," by F. F. Rogers and L. L. Hardt (by invitation).

The third joint session was held on Wednesday morning, December 30, Dr. Lusk presiding. The following papers and demonstrations were presented:

"Recuperation: Nitrogen Metabolism of a Man when Ingesting Successively a Non-protein and a Normal Diet after a Seven-day Fast," by F. D. Zeman (by invitation), J. Kohn (by invitation) and P. E. Howe.

"Some Studies in Autolysis," by H. C. Bradley.

"The Diastase of the Blood," by H. McGuigan and C. L. v. Hess (by invitation).

"The Rate of Oxidation of Enzymes and their Corresponding Proenzymes," by W. E. Burge.

"The Harmful Effect of an Exclusive Vegetable Diet," by C. Voegtlin.

"The Effect of Long-continued Feeding of Saponin from the Bark of *Guaiacum officinale*" (read by title), by C. L. Alsberg and C. S. Smith (by invitation).

"Fat Infiltration of the Liver and Kidney Induced by Diet," by E. L. Opie and L. B. Alford (by invitation).

"On the Nature of the Hepatic Fatty Infiltration in Late Pregnancy and Early Lactation," by V. H. Mottram (by invitation).

"The Synthesis of Hippuric Acid in Experimental Tartrate Nephritis in Rabbit," by F. B. Kingsbury (by invitation) and E. T. Bell (by invitation).

Demonstrations

Blood Pressure Method, by C. Brooks and A. B. Luckhardt.

Demonstration of a Point-to-point Method for Analyzing Induction Shocks by means of the String Galvanometer, by J. Erlanger and W. E. Garrey.

A Device for Projecting a Small Spot of Light Suitable for Exploring Photo-sensitive Areas, by B. M. Potter (by invitation).

Demonstration of the Effect of Sodium-iodoxybenzoate on Inflammation caused by Mustard Oil, by S. Amberg and D. McClure (by invitation).

An Arrangement of the Porter Clock to Give Three Time Intervals at the Same Time, by Worth Hale.

A Portable Respiratory Machine Furnishing Continuous, Intermittent and Remittent Streams of Air, by F. L. Gates (by invitation).

The Determination of Blood Sugar, by P. A. Shaffer.

On Wednesday afternoon the local committee arranged a series of enjoyable visits to the St. Louis hospitals and laboratories and also to the beautifully located, impressive buildings of Washington University.

Dinners and Smokers.—This part of the program was inaugurated by a dinner given by the local committee on Sunday evening, December 27, to the officers and councils of the constituent societies of the federation and of the Anatomists.

The customary and universally satisfactory informal subscription dinners and smokers were held on the evenings of December 28, 29 and 30; the first two at the Hotel Jefferson and the last one at the Hotel Warwick. Perhaps the most enjoyable of these was the first on December 28, when a number of excellent speeches were delivered, the speakers being the guests of the evening, Mr. R. S. Brookings, Dr. Graham Lusk, Dr. J. George Adami and Dr. G. Carl Huber.

At the last executive session of the Pharmacological Society a motion was put and passed unanimously to thank the authorities of Washington University for their hospitality and the local committee for its broad and efficient efforts to render the stay of their guests in St. Louis as pleasant and profitable as possible.

The next meeting of the federation will be held in 1915 in Boston at the Harvard Medical School.

John Auer,
Secretary

Rockefeller Institute